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August 1988

An Air Age Publication

48120

MODEL AIRPLANE NEWS

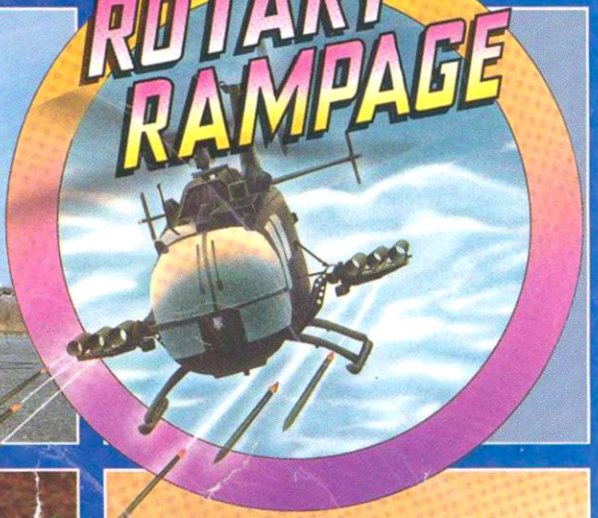
THE WORLD'S PREMIER R/C MODELING MAGAZINE

Canada $3.75

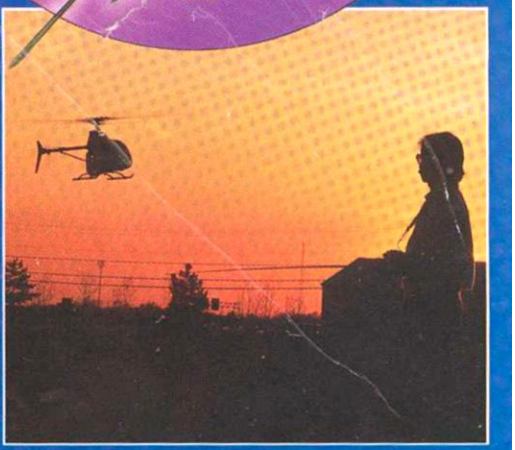
4 R/C Helicopter Reviews

Helicopter Basics

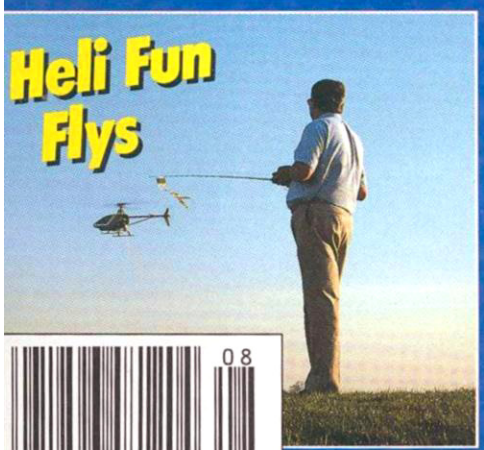
ROTARY RAMPAGE



Enya SS-50 Heli



Heli Fun Flys



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AUGUST 1988 VOLUME 116, NUMBER 8

MODEL AIRPLANE NEWS

ON THE COVER:
We're getting serious about this helicopter stuff! This issue is devoted to rotary-wing things, and our cover highlights only a small portion of the overall activity. Garrett Miller developed the rocket-launching "Rampage" logo, while our staff took most of the remaining shots.

FEATURES

COLUMNS

COLUMNS

DEPARTMENTS

Model Airplane News (ISSN 0026-7295) is published monthly by **Air Age, Inc.**, 251 Danbury Rd., Wilton, CT 06897. Second class postage paid at Wilton, Connecticut, and at additional mailing offices. Subscription rates are $25 for 1 year (foreign $33), $47 for 2 years (foreign $63), $65 for three years (foreign $89). **Postmaster:** Send Form 3579 to **Model Airplane News**, P.O. Box 428, Mount Morris, IL 61054.

Editorial

by RICH URAVITCH

THIS HOBBY NEVER CEASES to amaze me with all the challenges it presents. Just when you think you're good at something, a new "something" comes along that entices you enough to try it. Such was the case with my recent first attempt at R/C helicopter flying.

I originally decided to give it a shot concurrent with the decision to present this, our first helicopter special. What better way, I figured, to convey to you readers my impressions as a tyro helo pilot. I know a lot of you may be considering jumping into this rotary-wing thing—some of you with both feet—so we've put together this issue, which we hope will provide you with enough information to at least head you in the right direction. One thing you'll undoubtedly discover: There are probably as many, if not more, "ideal" approaches to getting started as there are machines. Oh, yeah, that's one of the first things you learn; seasoned fliers and aspiring novices alike all use the term "machine" when referring to their helicopters. You should use it too; it immediately creates the impression that you've been "into" helicopters much longer than you really may have. It also eliminates the need to memorize all the specific names like Legend, Jet Ranger, Baron, Omega, Shuttle, Cobra, X-Cell and many others. See how easy this helicopter thing is?

The machine (there's that word again!) reviews presented in this issue cover pretty much the full spectrum. The simple, non-collective-pitch Sport 500 was my entry point for this adventure, and it was a trainer in more ways than one. It answered many of my questions, confirmed some advice given me by more experienced helo fliers and dispelled a number of "mind-sets" taken by those I categorize as "puristosnobs"... You know the type: the guy who believes (and tells you) that you've got to spend megabucks to even be allowed on the field 'cause it just won't work unless it's expensive. Every segment of the hobby seems to have this type. I've seen it in ducted fans, pattern, scale and certainly in racing. It's an attitude that scares potentially interested newcomers off, which is exactly what the hobby, in general, *doesn't* need. The key here is to try something you might be interested in; see for yourself if it's worth pursuing, and then go for it. Sure, seek the *advice* of those with more experience, but temper it with your own views, which should include a frank evaluation of *your* ability to pursue it.

- Paul Tradelius, well-known R/C helicopter author who is a frequent contributor to these pages, has completed a book for us with the pencilled-in title of "Basics of R/C Helicopters." It's currently in the production stage and should be off the presses by late September. I admit to more than just a casual glance at the manuscript and pictures during my quest for helo proficiency. Paul has done his usual thorough job, and I think *all* R/C helicopter enthusiasts will find it contains a wealth of valuable information.
- Coming next month: The ⅛ Air Force Scale Fly-In, more helicopter coverage, "Floating Around," the Bay of Quinte Canadian Jet Rally '88 and a number of exciting new kit reviews.
- Keep those Mini F&Bs coming.

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U.S. & Possessions (including APO & FPO): 1 year $25.00; 2 years $47.00; 3 years $65.00. Outside U.S.: 1 year $33.00; 2 years $63.00; 3 years $89.00. Payment must be in U.S. funds.

MODEL AIRPLANE NEWS is published monthly by Air Age, Inc., 251 Danbury Rd., Wilton, CT 06897. Connecticut Editorial and Business Offices, 251 Danbury Rd., Wilton, CT 06897, phone 203-834-2900. Y.P. Johnson, President; G.E. DeFrancesco, Vice President; L.V. DeFrancesco, Secretary; Y.M. Micik, Treasurer. Second Class Postage paid at Wilton, Connecticut, and additional Mailing Office.

ISSN No. 0026-7295.

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Airwaves

Generous Responses

A few months ago, I wrote to you requesting plans for a P-6E, which was built by Goldberg a few years ago. You printed part of my letter in your "Airwaves" column, and to date, I've received about 35 phone calls or letters from readers regarding my request. I'm still getting letters, and they're from all parts of the U.S. and Canada. This shows what a great bunch of people read your magazine and the camaraderie involved in this sport. I was amazed with their generous responses.

Thank you for your help. I now have not only a set of plans, but also a kit.

William A. Ritchie
Temple Hills, MD

Mr. Ritchie, We're delighted that your S.O.S. drew a deluge of responses. It's a pleasure to be of service. This is our job.

I think your letter clearly demonstrates that our letters section is a great point of contact for modelers with special problems. If we at MAN *don't have the information, someone out there will. If need be, questions can be put to our entire readership, so don't be bashful.*

Again, thank you all for making the connection. CC

11 and Flying

I just want to comment on the Carl Goldberg Eaglet. It's only my second plane, and I'm only 11 years old, but I'm smart enough to know when I see a good airplane.

The building isn't very complicated. If I can build it, the rest of you can; it might take a while, but it's worth it.

With an O.S. 15, it flies like a dream. It's the perfect engine for takeoffs from an asphalt runway. It takes a 2- to 4-channel radio. I put in a 4-channel, because I like to fly with rudder, elevator, throttle and aileron control. If you're looking for a good trainer, or even a plane for aerobatics, I recommend the Eaglet.

Jared Fowler
Germantown, TN

Jared, I, too, have seen many fledglings earn their wings with this great little trainer. Goldberg has always been a leader when it comes to helping the beginner, and his instruction booklets are like mini guides: They assume you have no prior knowledge of R/C.

I hope your success will help to encourage other struggling neophytes to hang in there during the rough times and landings. CC

Original T-Bird

I'm just reading the Feb. '88 issue of your great mag. It takes a long time to reach us here! I wish to build a vintage stunt C/L radial-cowl Thunderbird, which I believe was the original T-Bird, and our club president wishes to build the original (or earlier) Nobler. I have a Johnson Super Stunt 36 that is still as good as the day I bought it in 1954. It has about 150 hours on it. Was there ever a plan published for either or both of these models, or can you get in touch with Bob Palmer and George Aldrich to see if they would send us an old plan? Both models were kitted in the past. It's a tall order, but I do hope you can help.

Frank Lynch
2 Bonyi St, Sunnybank Hills
Brisbane 4109 0LO, Australia

Frank, we no longer have plans for the original. The "improved" version was never published, but was kitted originally by Veco and subsequently by Dumas. We'll forward copies of your letter to both Bob Palmer and George Aldrich, and by printing your name and address, maybe we'll encourage fellow modelers to be of help. RAU

Annual Index Request

I've been a subscriber to your magazine for several years and I store each issue. Since there's always a need to refer back to an article, etc., would it be possible for

(Continued on page 10)

Airwaves

your magazine to publish a yearly index of the contents of each issue? Several other magazines I subscribe to publish this list and I transfer the index to a computer data file for easy storage.

I would greatly appreciate your magazine looking into this matter, and I'm sure others will too.

Ed Eldridge
Winter Park, FL

Great idea Ed, and one that we've considered but never quite got under way. Our new building, expanded staff and state-of-the-art equipment will make it possible. Look for it in the future. RAU

Model Airship News??

I greatly enjoy reading your publication and have been told that you might be able to help me.

I'm interested in building a scale working model of an airship (*not* a blimp). I think you once published details of such a project. Perhaps you would send me a copy of this, or let me know where I can obtain details.

David Style
46 Havil St., Camberwell
London, England SE5 7RS.

David, the local corporate memory doesn't recall an airship being presented as a scale working model in MAN. *It sounds like an intriguing project, so we'll print your full address in the hope that other R/Cers with similar interests might contact you. Keep us posted.* RAU

Double Your Pleasure?

In reference to your Baby Bipe plans in the May '88 issue: I found a "boo-boo." The fuselage doubler's wood grain runs the same way as the fuselage wood grain, and that's a "no-no;" they should run 90 degrees to the wood grain of the fuselage for added strength.

I thought you might like to know it so you could change your plans, and the construction article doesn't say anything about it.

Jack W. Leslie
Ridgecrest, CA

Nice catch, Jack. The doublers will *work better if you follow the usual practice of orienting them 90 degrees to the grain of the fuselage sides. The construction photos show it, but the detail was overlooked in the plans inking. Joe "About Those Engines" Wagner is starting a new column in the next issue dealing with "Building Models," and he'll be discussing just such preferred building practices.* RAU

Well-Deserved Praise

My thanks to you and your staff for the finest publication in the radio-control hobby today. During the past year, the changes at *MAN* have been nothing short of dramatic. The current format is absolutely excellent, especially the kit reviews. I get an honest opinion about each kit, and the color photos are just gorgeous. I hope this part of the magazine will always remain the same.

I especially enjoyed the June '88 issue, which included the article by Frank Tiano. I wish we could have more input from Frank.

I also like the material being written by your Associate Editor, Chris Chianelli. His articles are professional, informative, humorous and very well written. Chris and I both love ARF aircraft (especially Hobby Shack's EZ Series) and 4-cycle engines.

My main interest is pattern-type aircraft. Again, what can I say? Mike Lee's "Pattern Matters" is a great column, and his reviews of pattern aircraft are outstanding.

I guess that epoxy has cured by now; it's back to the shop to have at it on my Hobby Shack ¼-scale Diabolo. Thank you for a superb magazine.

Bobby Patterson
Point Pleasant, WV

Bobby, thank you for writing. We're always pleased to hear that we're doing things right. Stay tuned for further improvements... RAU

We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News,** 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and length.

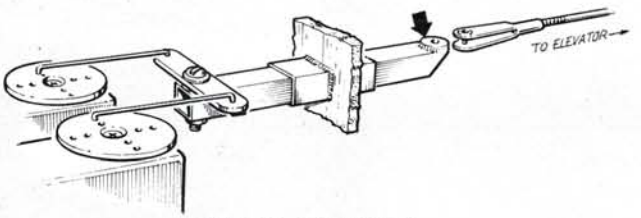
Hints & Kinks

by JIM NEWMAN

VALVE-GRINDING TOOL

Some miniature valves don't have a grinding-tool slot in the head, and this modeler is reluctant to grind his own, for fear of weakening the head. Instead, he found it easy to glue the eraser end of a pencil to the valve face with CA and a shot of accelerator. On completion of the grinding, he slices off the eraser and polishes the valve face with No. 400 wet or dry paper.

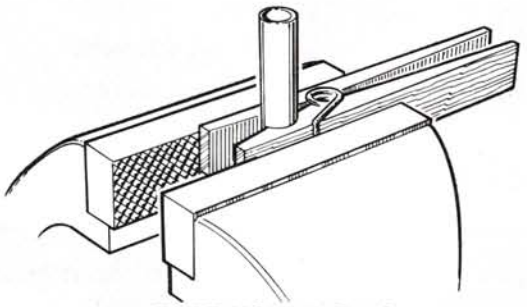
Ken Achee, Hattiesburg, MS



SERVO DOUBLER

In giant models, it's usual to "double up" on elevator servos. Here's an elevator doubler made from a common brass tube. Failure of one servo halves the available servo throw, but still allows you to fly safely home. I added a thickness doubler by soldering on extra metal where the clevis attaches (see arrow). This is necessary to provide a more robust bearing for the clevis pin, but I'd prefer to use a Du-Bro Swivel Ball-Link in place of the clevis. The bellcrank coupling the two servos can be made from a regular, thick U-Control bellcrank.

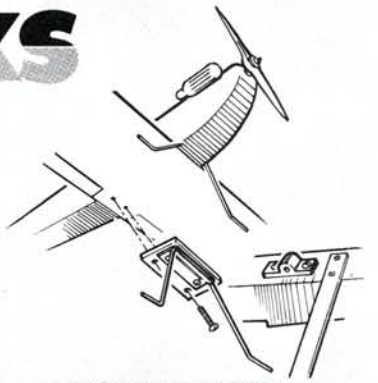
Earl Kennedy, Trinity, NC



TUBE-HOLDING JIG

Holding a thin tube to file or drill it, etc., can be tricky. Slip the tube into a regular spring-type clothespin, and then put the pin into a vise. Several sizes of slots can be filed in the pin to accept more than one size of tube.

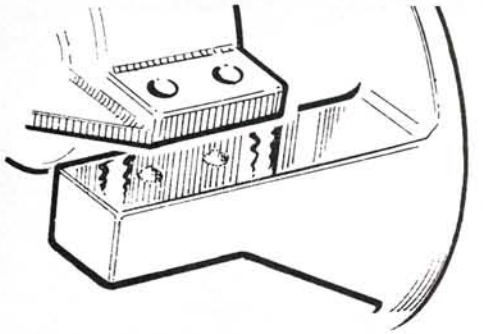
Bob Robert, Durrington, Wilts., England



FLOAT ADAPTER

This is a quickly made unit designed to adapt rear float struts to a low-wing model. A metal clip wraps around the horizontal section of the rear struts and is then screwed into a plywood plate. The plate is drilled to match the wing-attachment bolts and is clamped in place by them. The floats are fitted with ordinary nylon nose-gear bearings through which the landing-gear axles and rear attachments fit and are then retained by regular wheel collars. The contributor also recommends thin aluminum spreaders to keep the floats tracking correctly.

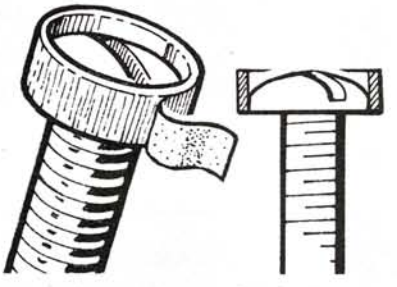
Bill Hallier, Concord, CA



ENGINE-MOUNT MARKING

Before drilling engine mounts, spread a thin film of oil over the mounting surfaces. Set the engine in place, align as required, then drop a pinch of talcum powder (or baking soda?) into the mounting holes. Carefully lift the engine, and you'll find neat, white dots marking the spots to be punched and drilled.

Scott Kirkman, Merced, CA



SAFETY WING BOLT

Wrap a narrow strip of masking tape several times around the heads of your wing bolts, and give the tape a shot of CA glue to harden it. The resulting "fence" prevents the screwdriver from skidding out of the slot and scarring the finish of the wing.

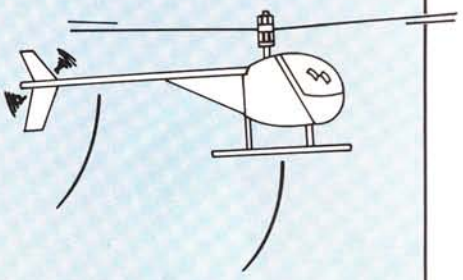
Euegene King, Buffalo, NY

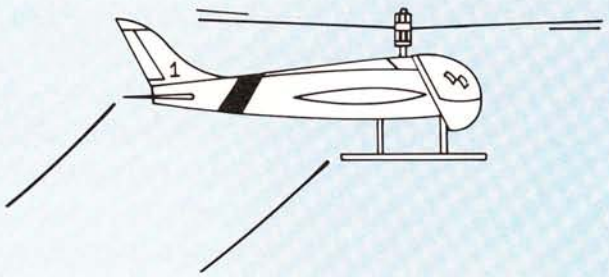
Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o **Model Airplane News**, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

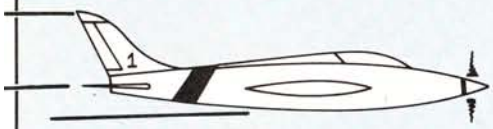
TRANSITION

Fixed Wing to Rotary

by TIM DiPERI







LET'S LOOK AT helicopter flying from a fixed-wing pilot's perspective. It's obvious that advertisements for any product are designed to make you buy that product, but ads don't give you any feel for what's actually involved in building and flying your first helicopter. To make things a little easier for the first-timer, I'll describe *one* way to start flying these great machines. There are *other* approaches, but this one "works for me."

Kits

There are three classes of modern helicopter kits available, some more advanced than others. When I say "modern," I mean collective pitch, five-servo-operation machines. Their prices range from about $300 to $1,000, and the machines are usually categorized by engine size, i.e., .25 to .32 (small); .40 to .50 (medium); and .60 to .61 (large). Each size category has advantages and disadvantages.

- .25 to .32 size: Several manufacturers produce these smaller machines, and one even offers a completely built mini helicopter! Smallness is an obvious advantage. Most cars can easily accommodate one of these machines. Also, since these machines are powered by relatively small engines, they are fuel efficient. Cost is a major consideration for a new heli pilot, and both the smaller machines and their parts are considerably less expensive than the larger machines. Because these machines have been designed for inexperienced modelers, even a lower-priced helicopter radio will enable you to fly successfully. On the other hand, a small helicopter's inability to cope with wind is a disadvantage. Just as a small airplane is pushed around by gusts, so is a small helicopter. Also, remember that you only get what you pay for; manufacturers of less expensive machines don't include all the embellishments that some heli fliers would like. Usually, by the time new heli fliers realize that they'd like these embellishments, they're ready to upgrade anyway. Mini helicopters are very appropriate for learning helicopter hovering and forward flight.
- .40 to .50 size: I think this size is the *best* for beginners, but I'll describe the disadvantages first. Apart from physical size, the only disadvantage is cost. Although less expensive than the larger machines, they cost more than the mini machines. Also, their larger engines use more fuel, and although a low-price radio can be used, I advise you to spend a little more if you can. These factors increase cost, but the advantages far outweigh the disadvantages. A larger machine is less affected by the wind. Also, most manufacturers offer parts to upgrade your medium machine to large-machine standards for a relatively small cash investment, and you can't do this with a mini machine.
- .60 to .61 size: New heli fliers (and I'm aiming my article at newcomers) should only start with a larger machine if they feel strongly enough about helicopter flying

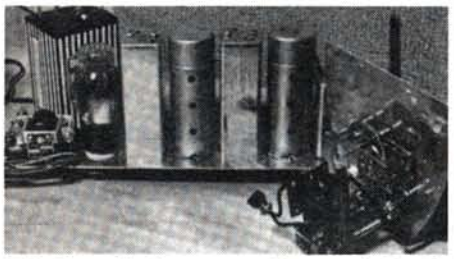
(Continued on page 83)

Fifty Years Ago . . .

by STEVE POND

FIFTY YEARS AGO, the August issue of *Model Airplane News* featured an article by Clinton B. DeSoto on a radio-control-powered soarer. The aircraft, which was specially built to accommodate the radio system, was a gull-wing soarer with 18 feet of wing and over 2,880 inches of wing area!

The R/C system was similar to the rubber-powered escapement system described in the January '38 issue. Because it had only one channel, the system was only able to control the rudder, which now had an electric motor to operate the control surfaces instead of the rubber band used previously.



This shows the d.c. motor and gear train. Simple impulses actuate the relay at the left, and this turns the motor on and off.

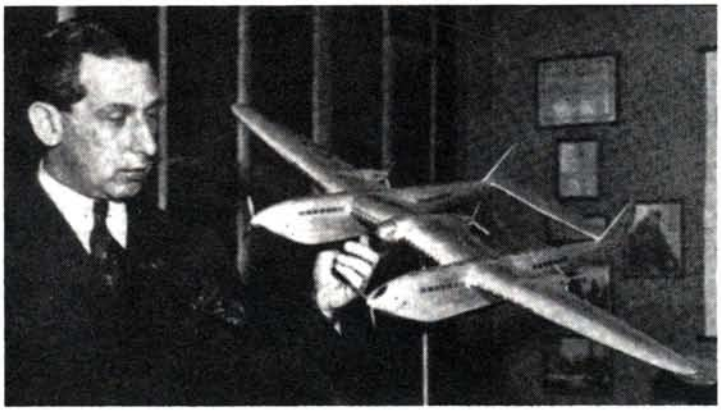
The motor, which was removed from an automobile defroster unit, was connected to the gear reduction of an old, defunct alarm clock. With a 1,000-1 ratio, the control disk used on the escapement system would take 10 seconds to make one rotation. This wasn't too practical for model airplane flying, but with that gear ratio, it might have been able to pull your car from the mud! Although it was experimental, this motor setup was the ancestor of the servo! The transmitter was still as big as ever, and it required an operator with an amateur station license.

This glider was one of the early R/C experiments. It had a wingspan of 18 feet and used a gas engine to get it up to altitude.

On the frontier of full-scale aviation, there were a number of new passenger aircraft, including the odd-looking Capelis "X" Transport, whose cockpit windows resembled those of a control tower. Pan American Airways had also requested bids from aircraft manufacturers to construct a trans-Atlantic flying boat that would have a cruising range of 5,000 miles and a cruising speed of 200mph. With a minimum payload capacity of 25,000 pounds, a crew of 16 and 100 passengers, the craft would have had to be able to maintain an altitude of over 20,000 feet.

This rare shot of the Capelis "X" Transport shows the odd forward-sloping windshield.

Bids were taken from Sikorsky, Boeing, Consolidated, Douglas and Seversky. This was the perfect opportunity for Col. Seversky to submit the plans for his Super Clipper, which had been introduced in the July '38 issue of *Model Airplane News*. The proposed Super Clipper was to have accommodations for 120 passengers, a payload capacity of 43,000 pounds, a cruising range of 5,000 miles, a cruising speed of 200mph and a top speed of 300mph.



Colonel Alexander P. deSeversky, shown here examining a model of his proposed trans-oceanic clipper.

This Hall-Aluminum PH-2 was the Coast Guard's newest patrol plane.

New military aircraft included the Northrop BT-1 dive bomber and the Hall-Aluminum PH-2 patrol plane that was built for the U.S. Coast Guard.

Next month, you'll find out who was awarded the Pan-Am contract for the flying boat.

Helicopter Fun Flys

Recipe for a successful helo gathering.

A line-up of helicopters and fliers at the Mid-West Helicopter Association's March Fun Fly. More than 33 pilots with their helicopters attended.

Photo by Paul Tradelius.

by PAUL TRADELIUS

I'M NOT SURE when the first fun fly took place, but until relatively recently, all we had to look forward to was the usual weekend flying or formal contests. The weekend flying was enjoyable, but there wasn't the opportunity to meet others in our hobby, and contests didn't attract average fliers because they thought they weren't good enough. So some smart guy or gal came up with the idea of having a fun fly—a combination of weekend flying and a slightly challenging event or two to keep everyone's interest.

As the name implies, the fun fly was designed for fliers to have *fun* flying *together*. But the *safety* of the fliers and the spectators is important as well. Helicopters are rapidly growing in popularity, and many fliers practice in their back yards or in nearby fields, but there seems to be a lack of understanding of just how dangerous a helicopter can be if not flown safely or properly taken care of.

Fun flys should cater to fliers of all skill levels. The beginner may not want to show off his "pride and joy" with training gear while others display their advanced flying skills. However, a fun fly should offer the opportunity to develop skills, as well as the opportunity to participate with others. One of our hobby's greatest thrills is the mastery of some form of helicopter flight that only a short time ago seemed almost impossible. Once mastered, the maneuver becomes easy, and fliers are ready to tackle something even more advanced. Providing a forum where we can learn from one another should be our main objective when holding a fun fly.

- Preparation: This must begin weeks before the fun fly is scheduled to take place. With club members responsible for different tasks, the club can work as a whole to get the job done, i.e., making sure that the field is mowed, the trash containers are supplied, a proper frequency-control board is staffed, etc.

Ask each club member to suggest events for the novice, intermediate and more advanced fliers; this should give you plenty of events to choose from, and possibly some fresh ideas, too. The timed hover event is simple and has a wide appeal. The novice is required to hover (or at least to do the best he or she can) for a minute, without looking at a watch. More advanced fliers have to fly around for two minutes, while telling jokes to disrupt the time-counting schemes of others. Naturally, the winner is the one who comes closest to the prescribed time limit.

Having pilots try to pick up a cone with their landing skids is a good intermediate event. To even the chances and add a little humor, I make this a timed event, and start by having all entrants eat a peanut butter cracker sandwich while trying to whistle. Some of the faces made have to be seen to be believed!

The two-person team event is a spin-off of the cone event. One pilot takes the cone to the second pilot, and the second pilot returns it to the starting point.

For more advanced fliers, an autorotation contest is always enjoyable, both for participants and for spectators. However, it's important to ensure that no one is pushed beyond his or her capabilities. Having each pilot make five autos, and counting only his or her best one, gives everyone a chance to make a mistake and still recover. Since straight-in autos are easier than the 180-degree variety, an extra bonus is awarded to those making the 180-degree turn.

- Sponsors: Early preparation gives you the opportunity to contact local hobby shops, manufacturers and distribu-

(Continued on page 114)

*Do **you** want a great-flying **Telemaster?** Would you like it **perfectly built** to make **sure** it flies great?*

HLA106 Hobby Lobby
Telemaster 2000 ..... **$199.00**
List price $279.00

There are two reasons that you might buy a pre-constructed RC airplane. One reason is that it saves you the time that's required to build it. But, the main reason to buy Telemaster 2000 is that a factory-assembled RC airplane can be built more precisely than a home-assembled one; particularly when it's a **big** airplane like Telemaster 2000. There are few modelers who have a workshop so well-equipped that they can jig-build a large RC airplane to asure perfect structures and flawless flight characteristics.

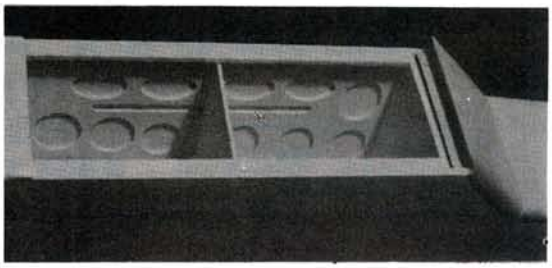
Telemaster 2000 is our attempt to deliver to you the **perfect** RC model airplane.

With the reliable radio systems available now, and with the forgiving and predictable flying characteristics of the Telemaster design, your Telemaster 2000 may last for many years. By shipping to you a pre-built balsa/plywood airframe that's built as well as its European craftsmen can build it, we can get into your hands a Telemaster that will perform in the air as well as our fifteen years worth of Telemaster ads have promised!

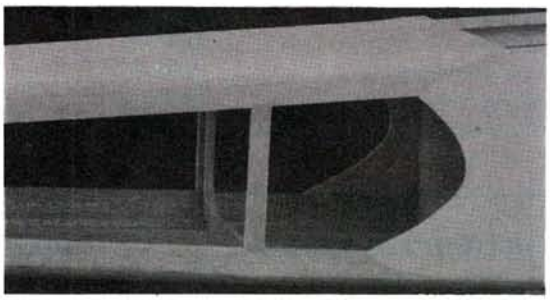
Telemaster 2000 has a 79" wingspan (2000 millimeters — two meters). The wing area is 875 sq. inches. Fuselage length overall is about 52". The airplane is designed for wing flaps, and the instructions describe how to install them. Five RC channels are required (Rudder, Elevator, Ailerons, Flaps, Engine Throttle). You can use a wide range of engines from .40 two-stroke or .60 4-stroke up to .60 two-stroke or .90 4-stroke sizes. The nose section was designed to be long enough for the 4-stroke engines.

Telemaster 2000 has the usual Telemaster flying characteristics: It is an excellent first trainer. But, it is also aerobatic. And, Telemaster 2000 is big enough so you can easily keep your eye on it in the air. Landings are dreamlike — without flaps it can be "greased" in even by beginners, and **with** flaps it can be landed on runways that are too short for other RC planes.

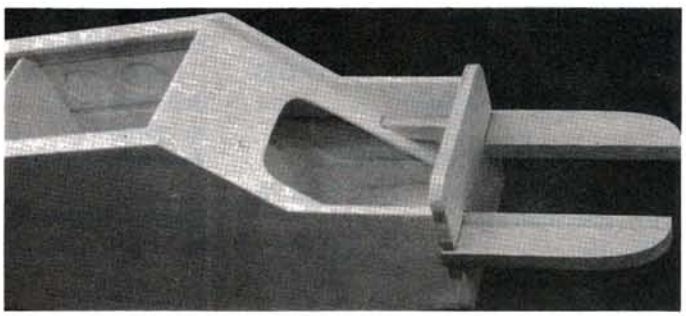
The pre-built structures are conventional balsa and plywood structures.



The fuselage has plywood doublers with numerous lightening holes inside an exterior plywood outside sheet.

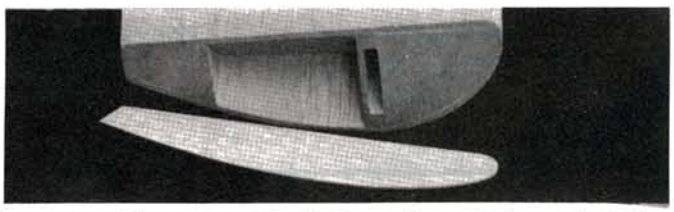


These are joined to the balsa rear section which is made of quarter-round balsa pieces that give Telemaster 2000 a pleasing roundness.



The forward nose section has 11" long hardwood engine mounts that spread the engine vibration forces across the strongest portion of the nose section.

The wing halves are all balsa fully built-up rib and spar structures.



The roots and tips are machined balsa sections of extreme strength to eliminate damage during tip-down dings.

The wings are fully sheeted with balsa, and an unusual feature is that the between-rib sections may be either punched out or left in place.

The hardware is excellent quality and you will only need to buy relatively few items to complete your own particular radio installation. The instructions are simply written and fully illustrated to help you speed up your covering and finishing and RC equipment installation. Even if you are a great builder you will appreciate the way **Telemaster 2000** is **constructed.** And regardless of your flying ability you will appreciate the way it **flies.**

HOBBY LOBBY
INTERNATIONAL, INC.®

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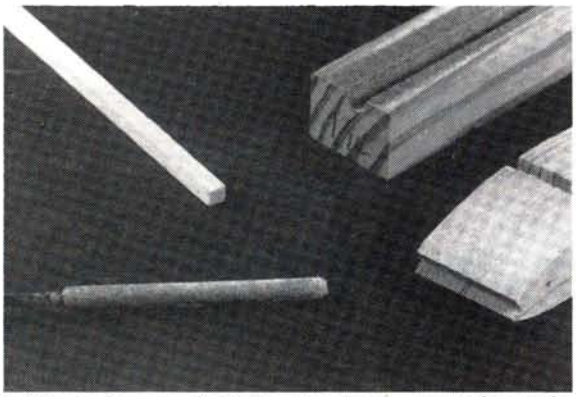
How To:

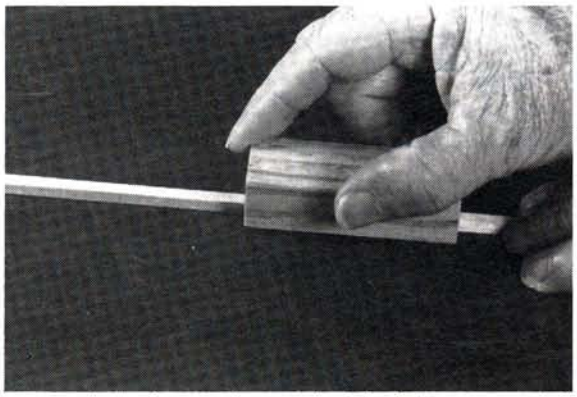
by RANDY RANDOLPH

MAKE ROUND LEADING EDGES

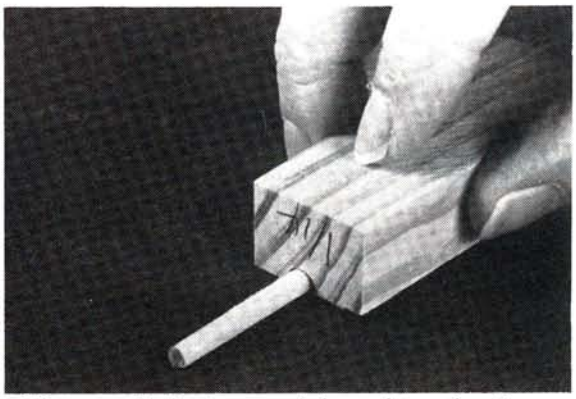
When an airfoil section is plotted, the leading edge is always shown as part of a circle of a given radius. Since that's the case, why not use a round leading edge in the first place, rather than having to shape it after the wing has been finished? The photos show how to modify square leading edges.



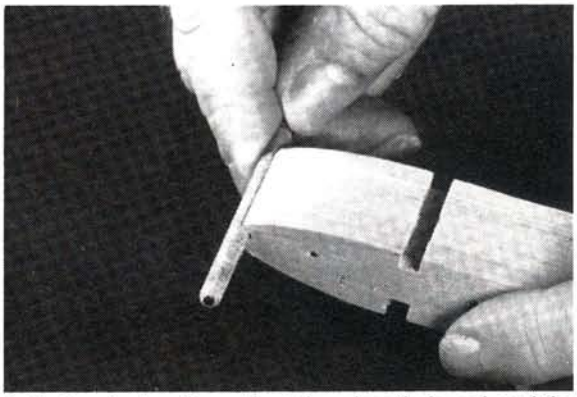
1. A few tools are needed: 100-grit sandpaper wrapped around a length of ⅛-inch wire; the ¼-inch shaping tool that was described in the February '88 issue. Materials: ¼-inch square balsa and ribs.



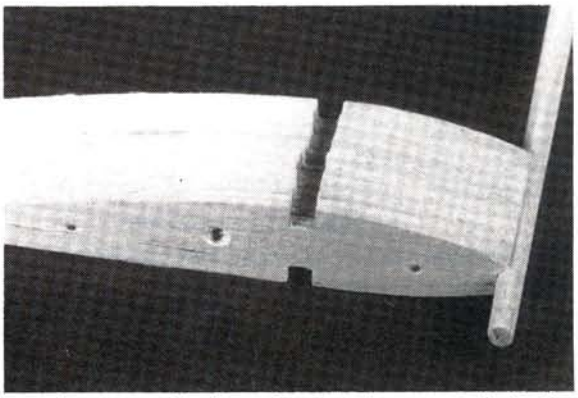
2. On a flat surface, sand one side of the balsa strip to a half round. Actually, hardwood dowel could be used, but this is heavy and usually warped, so you have to select very carefully.



3. When one side has been sanded round, turn the strip over and sand the other side. This method gives better results than using a plane to trim the edge from the strip and rounding it between sheets of sandpaper, as it produces a more uniform thickness of wood.



4. Pin the ribs together with all the edges flush, and sand the leading-edge notch into a half-round. About two layers of sandpaper on a piece of ⅛-inch music wire makes a ¼-inch tool.



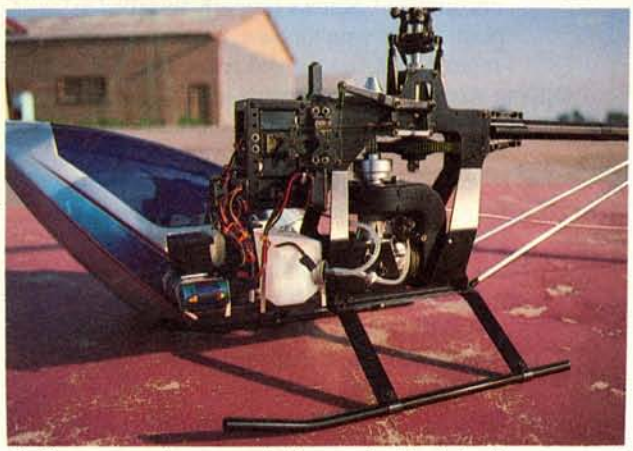
5. Making a round leading edge not only saves much shaping later, but also offers an increased gluing surface to each rib. This makes a stronger overall structure, with no weight increase!

SPECIAL EDITI

ROTARY RAMPAGE

Photos by Dick Tristao.

by DICK TRISTAO



Radio components are carried in a sandwich of plastic spacers and aluminum frames. Compact installation allows for quick removal of entire servo carrier for maintenance or cleaning. Ample floor space for necessities such as receiver, battery pack and gyro.

Gorham Model Products

STORK

SMOOTHNESS AND AGILITY COMBINE TO MAKE THIS MACHINE A FUN HELICOPTER.

WHEN I THINK OF a stork, I see visions of a large gangly bird, and folklore reminds me that storks bring new "bundles of joy" into the world. A combination of these thoughts leads me to the GMP* Special Edition Stork. The GMP SE Stork is certainly new and it brought *me* joy, but it isn't a lanky, skinny bird! Instead, picture a long, lean and graceful flying machine.

Gorham Model Products took the innovative, successful Hirobo design and modified it to fit the

Combined efforts of Hirobo and GMP engineering produces another high-quality, high-value model. The SE Stork's space-age plastic offers incredible strength, resilience and light weight. This allows great flight speed with minimal additional collective beyond hover. Assembly is easy, quick and painless!

requirements of U.S. consumers. Here, we want strength and lightness, easy assembly and repair, and we want a machine that can be successfully flown by a modeler with a wide range of skills. Did GMP succeed? In my book, yes, they did!

THE KIT: Parts are blister-packed, and a separate package contains all conversion and add-on pieces for the Special Edition. The instructions are well thought out and a logical building sequence is outlined. Carefully follow the booklet one page at a time. The only time-consuming elements are those common to all helicopter kits (except the Shuttle): canopy gluing, fitting and painting, and rotor-blade balancing and finishing.

CONSTRUCTION: The major components of the SE Stork are of molded glass-filled plastic, which is common to many of the newer-generation model helicopters. These components fit superbly well, and at no time was trimming of "flash" required. Ball bearings pressed firmly into molded pockets at heavy stress areas, and the alignment of the plastic pieces was perfect.

Self-tapping metal screws join most of the pieces, and this is the first area that can give trouble. If, with the correct size of screwdriver, all the screws are driven in until seated and not forced further, no problem with stripped threads will be encountered. Screws properly installed in plastic parts won't loosen, unless they are repeatedly removed and reinstalled. Self-tapping screws and plastic parts aren't elements for heavy-handed torque. Drive them in slowly and avoid making that "extra twist" once they're seated. My SE Stork has made over 50 flights, and not one self-tapping screw has moved.

Black anodized aluminum side frames hold the engine and main transmission pieces in typical GMP fashion. Spinner-cone starting is standard, as is the rear-facing engine, which

Business end of the SE Stork shows enclosed tail-rotor transmission. Full ball-bearing-supported shaft has pulley keyed to it, so slippage is impossible.

DDF-style rotor offers individual blade dampening. This gives the SE Stork a smooth all-around performance. Tightening the dampeners can speed up cyclic response for quicker aerobatics, but some loss of gentle hover may occur.

"...a long, lean and graceful flying machine..."

eliminates tedious glow-plug changing and a glow-battery extension. A new O.S.* .61 FSR-H with a 7-H carb fit exactly into the pre-drilled engine block. For those who prefer smaller engines, the mounting block is also drilled and tapped for the O.S. .45- to .50-series helicopter engines. Enya* engines will probably fit too, though I haven't tried them.

The collective- and cyclic-control bellcranks are mounted to the side frames using ball bearings on the collective and snug nylon bushings in the cyclic. Radio components mount into aluminum trays with plastic spacers and hold all servos in one tight compact unit. An aluminum floor juts forward from the main-frame bottom to provide mounting space for the fuel tank, receiver, battery pack and gyro. All control pushrods are made using the dimensions given in the instructions and, in my case, they required only a few extra turns here and there during the final set-up.

On the main rotor shaft, the assembled, all-metal swashplate required only the attachment of the control balls using a liberal amount of

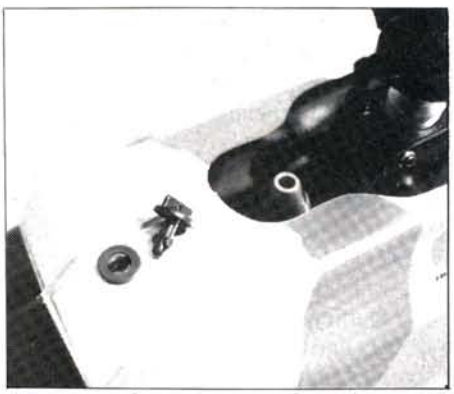
(Continued on page 28)

Round object between side frames is power take-off to the belt-drive tail rotor. This virtually maintenance-free system provides tremendous thrust to the tail rotor. Owners of both strong and weak gyros will turn sensitivity adjustments way down, compared with the usual settings of other models. It's possible to fly the SE Stork backwards at a darned fast clip!

STORK

thread-locking compound. Above that, the washout control is assembled from plastic pieces and steel pivot pins. The washout arms are attached with bolts passing through nylon bushings. A tiny spot of grease on the bolt surface and "snug'n'feel" tightening will produce a smooth, effortless, play-free fit. This technique will also produce similar results in the remaining assembly needed to complete the rotor head.

The flybar seesaw is really the major assembly step on top of this machine. It fits into the main hub and is pinned through the pre-assembled main DDF (Dual Dampened Flapping) seesaw. Rotor-head design is always the center of controversy in any helicopter's performance, and the Hirobo DDF has its share of pros and cons. More on that later.



Canopy attachment is among the easiest to use. Cam-lock-type device holds top to main frame. Chassis floor has two metal tabs that protrude through slots in canopy bottom. Pops on and off in seconds.

Lightweight aluminum skids and formed struts provide sturdy legs for the Stork and handle hard touchdowns easily, including poorly timed autos.

Hirobo's unique use of a light, octagonal, aluminum tube for the tail boom provides solutions to many time-consuming assembly and alignment steps in other makes of helicopters. Molded plastic couplers for the front and rear of the boom simply slip onto the flats of the boom and key into provided holes. Self-tapping screws secure the pieces. The front coupler then bolts to the main chassis, while the rear coupler accepts the ball bearings, pulley and output shaft for the tail rotor.

(Continued on page 97)

Small Steps

by JOE WAGNER

LIGHTNESS IS THE KEY to having a successful small R/C airplane. In our previous columns, Randy and I have described several ways of keeping model weight as low as possible, and here's another way:

Batteries are often too heavy for small models. The usual 500mAh receiver Ni-Cd pack weighs four ounces, as does the set of four AA pen-cells used by the Cox Cadet and other inexpensive R/C sets for receiver/servo power. By substituting a 100mAh pack, weight can be reduced by more than *50 percent.* At 1½ ounces or less, these little batteries offer an easy way of reducing the overall weight of a small R/C model, and since they're so small, installation is easier.

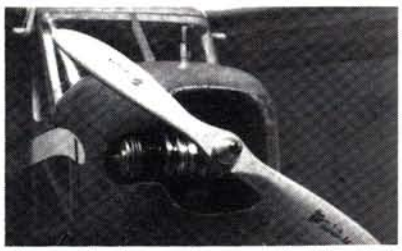
Another advantage of small battery packs is that in a crash (which all models experience sooner or later!) their lower

With Ace R/C's FFC Field Charger and 12V gel-type battery, you can fly all day with a 100mAh battery powering your airborne R/C system.

inertia helps minimize damage to the model's structure.

A disadvantage of the small Ni-Cd packs is their lower capacity. A fully charged 500mAh battery is normally good for almost two hours of flying time, or ten 12-minute flights. At best, 100mAh batteries have only a quarter of that endurance. However, the use of 100mAh batteries in your small R/C model won't necessarily limit your flights to only two or three per flying session, as it's easy to recharge your Ni-Cds at the field.

There are several makes and types of



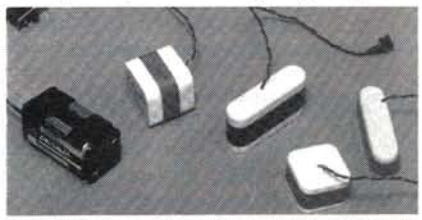
Cox reed-valve engines can be throttled! This is a somewhat modified Dragonfly .049. If you're interested in how this was set up, write to author, enclosing an SASE.

"field chargers" on the market. Because of its versatility, I use Ace R/C's* FFC Charge System. It can quick-charge both the receiver and the transmitter batteries, either simultaneously or separately. It automatically goes from its 500mA fast-charge rate to a 35mA slow charge when the batteries near full capacity. The FFC is powered by either a small 12V "field kit" battery or by a car's electrical system. It takes about 10 minutes to recharge a 100mAh flight pack, and there's no risk of overcharging if your flight batteries are only slightly run down when you recharge them. The receiver-charging section contains two separate charge-limiting circuits: One monitors battery voltage; the other is sensitive to temperature. Together, these two control circuits do an excellent job of protecting the receiver batteries from harmful overcharging.

If your R/C system came with a 500mAh flight battery, you can easily replace it with a smaller one. Ace R/C has just what you need: replacement Ni-Cd packs in a variety of sizes, from 100mAh to 1,200mAh. The 100mAh battery weighs 1¼ ounces; 270mAh packs are an ounce heavier, and 450mAh batteries weigh 2.8 ounces—still more than an ounce *lighter* than a 500mAh pack, yet with almost the same capacity! These batteries contain Sanyo "Cadnica" cells that may be fast-charged without damage.

Connectors for the replacement batteries are also available from Ace, which carries those by Deans, Kraft, Futaba and Airtronics. With a mini soldering iron, you can fix up a replacement flight-battery pack for your R/C system in only a few minutes, regardless of the size of your model. If you have a quarter-scaler, you can make up a new 1,200mAh battery for this as easily as you put together 100mAh or 270mAh packs for your small airplanes. Red wire to the positive battery terminal and black to the negative battery terminal—it's that simple!

Everybody likes scale models. Visualizing a miniature deHavilland Mosquito, a Grumman Gulfhawk, or a Boeing P-26A maneuvering gracefully in the sky under your control is truly inspiring! And



From left to right: *a typical 4AA-cell flight battery (4 ounces), and various Ace replacement Ni-Cd packs: 450mAh (2.8 ounces); 270mAh (2.25 ounces); and square and flat 100mAh packs (1.25 ounces each).*

it *can* be done. However, I have to admit that larger scale models fly better than small ones, because of the higher efficiency of larger flying surfaces. Many explanations have been offered for this, but there's one undisputed fact: Air flows turbulently *around* and *away* from the edges of a flying surface (i.e., a wing, stabilizer, rudder, or aileron), and this "edge interference" detracts from the surface's working efficiency.

The important relationship is that of area versus perimeter. If one model is twice the size of another, its stabilizer has double the perimeter of the smaller model's, but *four times* the working area. That's why a larger scale model's tail surfaces and controls operate more effectively than those of a miniature one. Small R/C scale models have acquired their reputation for skittishness because of this, but there's an easy solution to the problem: Make the smaller model's tail surfaces

bigger.

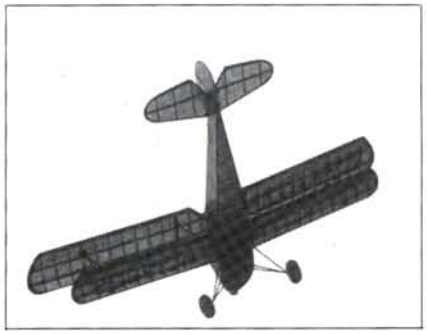
This trick was devised many years ago by designers of rubber-powered scale models. They'd had serious problems with stability when trying to fly exact-scale Wacos, Ryans and Boeings, even with far lower wing loadings than we can ever achieve with today's R/C airplanes. But by enlarging the tail surfaces of their scale models—sometimes by enlarging the tail area—designers like Bill Winter and Earl Stahl (well-known contributors to *Model Airplane News* half a century ago, and still active today) produced many realistic fine-flying rubber-powered scale models. In the '30s and '40s, almost every issue of *MAN* contained full-size plans for one of these. (I built and flew lots of them!)

In those days, the rule of thumb was that the horizontal tail needed to be about one-third of the wing area, and the vertical tail about one-third of the horizontal tail area. Those proportions resulted in reliable flying models. You might think that these greatly enlarged tails made the models look unrealistic. Not at all! Because their outlines were kept the same, the illusion of "scaleness" was maintained.

As fliers of small R/C scale models, we can use the same technique to improve the flying qualities of *our* airplanes. We don't need to go to quite the extremes of the rubber-powered scale jobs, because we have operating controls. A horizontal tail area of 25 percent of the wing area is ample for a 1/2A monoplane. A biplane can get along with less. (The stabilizer/elevator area of my little Wiley Post is only 12 percent of its wing area, although it has an unusually long fuselage for a biplane.)

The vertical tail area depends mostly on the dihedral angle of the model's wings. The more dihedral, the bigger the fin and rudder should be. High-wing R/C models without ailerons need five to seven degrees of dihedral on each side. Low-wingers require more—as much as 10 degrees for some types with low-aspect-ratio wings, i.e., those with broad chords and short wingspans.

A sure sign of insufficient vertical tail area is "Dutch rolling," a wing-rocking tendency in level flight. This isn't dangerous, but it can sometimes cause cartwheel landings. On the other hand, an oversize vertical tail seems to do no harm on an R/C model. In fact, the late Frank Courtney, a world-famous test-pilot of full-scale aircraft, once claimed that there has never been an aircraft designed with enough vertical tail area. And he had flown B-17s and PB4Y-2s!



Scale-size tail surfaces work well on this tiny (29-inch span) Wiley Post biplane, largely because it has such a long tail moment.

Another reason for problems with the control surfaces of small R/C models is their insufficient thickness. Thin, flat surfaces don't work as well aerodynamically as thicker, streamlined ones, and they're not stiff enough. A too-thin elevator or aileron tends to twist when deflected in flight, and this reduces its effectiveness. It may even produce erratic control response. Thicker, more dependable tail surfaces are easy to make, and need be no heavier than thinner ones. Built-up types are the lightest, of course, but thick all-sheet-balsa tails can also be made quite light.

First, use "contest-grade" balsa, because it weighs about half as much as the common grade. Lone Star Models* is a good source of this wood. Second, taper the surface so that it's thinner at the tips and trailing edges. This saves weight where stresses are low, and leaves the highly loaded areas thick. Thick tail surfaces can affect model performance more than you think. George Aldrich and I found this out in the 50s, with our U-Control Stunt model designs. My Super Chief and George's Nobler far outclassed everything on the market, mainly because their tail surfaces and wing flaps were more than twice as thick as those of our competitors.

Until next time ... Remember, good things come in small packages!

**Here are the addresses of the companies mentioned in this article:*

Ace R/C, Inc., P.O. Box 511, Higginsville, MO 64037.

Lone Star Models, 1623 57th St., Lubbock, TX 79412.

SCHLUTER

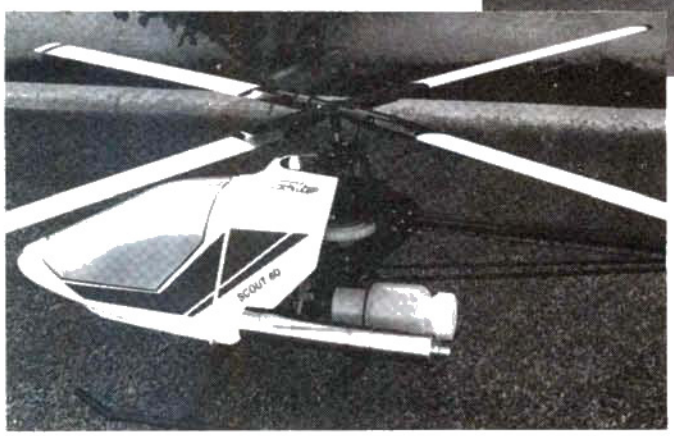
FOUR-BLADE ROTOR HEAD

A QUICK-LOOK EVALUATION OF A MULTI-BLADE ROTOR INSTALLED ON A PROVEN MACHINE.

by PAUL TRADELIUS

MOST HELICOPTERS flown today are the "standard" two-blade variety; they have two rotor blades with flybar and paddles. Now that helicopters and radio equipment are more sophisticated and reliable, other control systems can be used to create a more scale-like appearance or to change flight characteristics. I've tried many types of helicopters and control systems, but this is my first experience with a multi-blade rotor system.

The all-wood rotor blades incorporate a steel wire that's glued to the leading edge of the blade. This moves the chordwise CG forward and so improves blade stability.

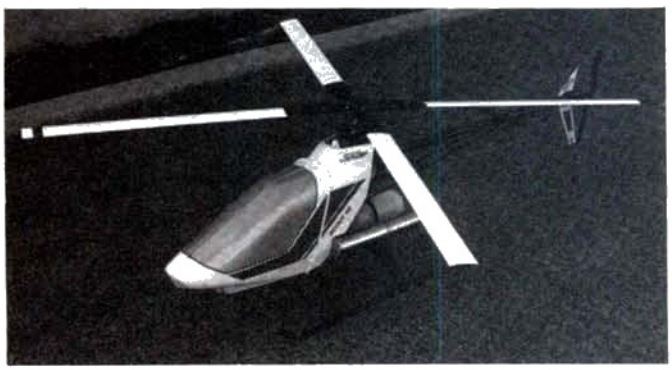


Using blade holders similar to the popular Champion, the Schluter 4-blade head is of the highest quality with simple, direct hookups to the Scout 60 swashplate.

In this issue, I review the Schluter Scout 60, and Schluter produces the four-blade rotor head reviewed here. Schluter also offers a three-blade rotor head, and both rotor heads are available from Robbe Model Sport*. Most of my comments will also apply to the three-blade head. Although the Schluter line of multi-blade rotor heads will operate on all their helicopters, the conversion is particularly easy on the Scout 60, because it has a sliding swashplate. The Scout 60, with a Schluter four-blade rotor head and an Agusta 109 fuselage would make an ideal scale helicopter package that should perform as well as it looks.

I've only had time to install the four-blade rotor head on my Scout 60, and flight tests have yet to come. However, I've already learned a lot about these rotor heads and I'm working on a performance article for a future issue.

- The Two-Blade System: Before discussing multi-blade heads, let's review the two-blade system. As well as having two main blades, most designs also have a flybar with paddles for added stability and control. To illustrate this, place your helicopter on the workbench with the blades extended, and move one paddle up and down. You should be able to see that by moving the paddle, you're also making an input to the pitch of the rotor blade. By changing the size, shape and weight of that paddle, you change the flight characteristics of the helicopter: a heavy/thick paddle for smoother, more stable flying, or a light/thin paddle for better aerobatic performance.



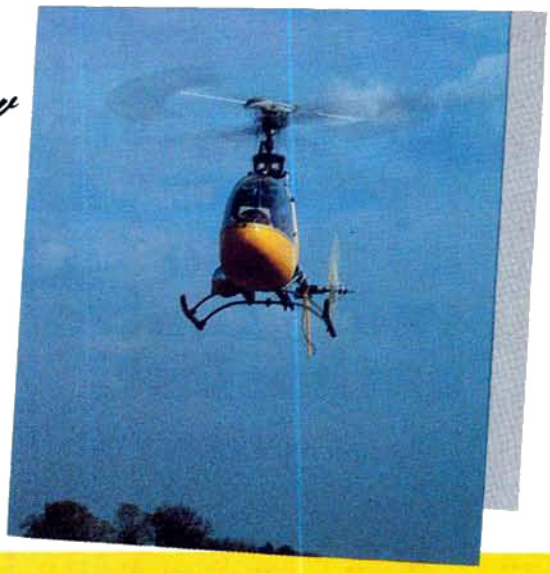
The Schluter Scout 60 with 4-blade head installed and ready for initial test flights. A variety of scale fuselages is available for a completely scale appearance.

The two rotor blades are also large in comparison with the smaller blades of the multi-blade head, since they have to do all the lifting. Their CG (center of gravity) is about 25 percent

(Continued on page 119)

Field & Bench Review

by RON FARKAS



KALT IS A well-known and respected Japanese manufacturer of model helicopters. Its product line includes machines ranging in size from .30-cubic-inch glow engines to 22cc gasoline engines, in pod-and-boom configurations and with scale fuselages. Their European contest record is impressive. Kalt helicopters are imported, and are now being distributed to retail shops by Hobby Dynamics*.

CIRCUS HOBBIES KALT BARON 30MX

Shatters the notion that small machines are lesser performers than their larger brothers.

The Kalt Baron 30 MX helicopter is the latest in a series of models that started with the Baron 20. Each variation has incorporated minor improvements and has taken advantage of the new small-displacement helicopter engines. The differences between the Baron 30 MX and the earlier models are more significant; it has longer main blades, a longer aluminum tail boom, an improved Bell-Hiller mixing linkage and metal clutch shoes as standard equipment.

While the Baron 30 MX remains a very good beginner's machine, it's designed to be considerably more aerobatic than its predecessors. Improvements make it more like the bigger helicopters, as it's capable of loops, rolls, autorotations, etc. However, given the constraints of the original design, this current 30 MX version has probably reached its maximum potential. For example, both the main-and tail-blade holders have dual ball bearings, but neither has thrust bearings. Still, the Baron does offer a range of performance that will permit its owner to graduate from beginner to quite advanced skill levels without outgrowing the machine. The Baron's low

Color photos by Rich Uravitch.

SPECIFICATIONS

Type: *Sport Helicopter*
Rotor Span: *48 inches*
Weight: *6 pounds*
Power Required: *.28-.32 glow engine*
Number of Channels: *4 to 5; heli radio preferred*
Suggested Retail Price: *$239.99*
Features: *Pod-and-boom structure; aluminum frame and boom; collective pitch with Bell-Hiller mixing; auto-rotation.*

Close-up of rotor head and control linkages between swashplate, seesaw, mixing arms and blade-grip pitch arms. These provide Bell/Hiller mixing of both paddle and blade pitch angles.

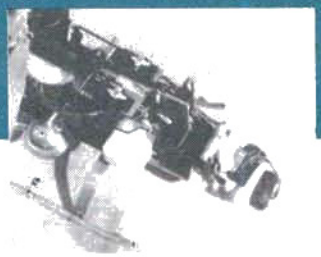
price and ease of assembly will continue to attract people who are just starting out in R/C helicopters. However, experienced and competitive fliers who have larger or more modern machines, might find that the Baron 30 MX is a good back-up model.

THE KIT: At first, the box seemed to be too small, but everything *was* there. All the parts for each sub-assembly were poly-bagged together, and the bags were numbered to match the assembly steps. Even the nuts and bolts were packed in their own numbered bags. Very helpful!

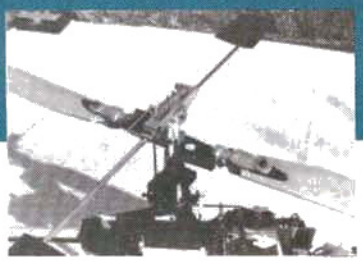
The rotor head comes entirely assembled, and the new tail boom is aluminum instead of the former carbon-fiber tube. The main blades are pre-finished with something like polyurethane varnish, so no covering is required. The fins are of molded plastic, so they don't need sanding or painting. The plastic cabin parts are bright yellow, and the canopy is already tinted, so there's no need to paint. The servo trays are plywood...oops! I'll need some paint after all!

I unfolded the exploded-view drawing; it's a really nice job. Then I opened the instruction manual and thumbed through the first few pages, which were in Japanese. The English version starts in the middle of the booklet. Unfortunately, there are no assembly photos or flying instructions in the book, and beginners really need them. However, the control-throw limits in the manual are a good starting place for a total beginner. A single page of supplementary set-up instructions by Dan Melnik, factory Tech Rep., is included, and this is aimed at more experienced fliers. After reading the instructions once, I got down to work.

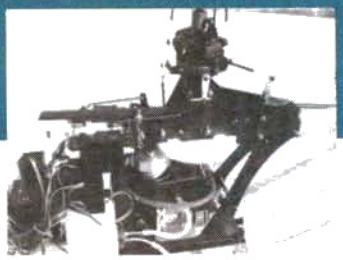
CONSTRUCTION: The model went together almost exactly according to the instructions, but there were several steps that should be explained in more detail. Also, the lack of photos of an actual model forces the builder to refer



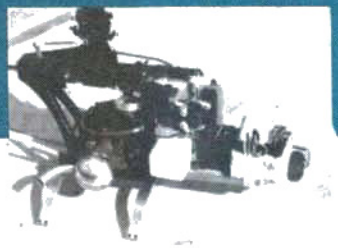
Top view of radio compartment, showing location of servos, gyro, receiver and battery. Plywood tray places servos in the best location for direct pushrod runs.



Side view of rotor head and control linkages. Note that main blade axles are connected by a flexible steel plate for flapping and dampening.



Left side, showing linkages to swashplate and scissors-arm assembly. Swashplate is fixed, while scissors-arm assembly rides up and down following the collective-pitch slider.



Right side, showing mechanical layout and radio component locations. Lower tray is just long enough for mounting the gyro and large battery pack.

continually to the separate exploded diagram. A first-time builder would probably have trouble recognizing some of the parts when comparing the text to the drawing. There were a few places where I saved some time by knowing in advance what I should do next, and this wouldn't be true of a beginner.

The first step is the assembly of the basic frame from the subframe members and the side-frame parts. Then the clutch bell and pinion are installed with ball bearings between the side frames. My pinion gear wouldn't fit into the clutch bell until I had reamed the hole a little.

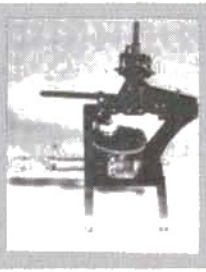
Next, I mounted the cooling fan and clutch assembly onto the engine shaft. I use a Webra* .28 heli engine, while the instructions only discuss O.S.* and Enya*. This caused a minor complication when installing the engine, but I minimized this by planning ahead. I discovered that the Webra engine could be properly located in the side frames by flipping the mount upside-down and using the holes that are pre-drilled for the O.S. engine. Kalt has thoughtfully provided extended throttle arms, but only for *their* choice of engines. However, I was able to reposition and bend the Webra arm to clear the cooling shroud.

The Baron 30 uses belt-and-pulley starting rather than top-cone engine starting. The latter is more popular and a little easier to use at the field, but accurate alignment of the starter shaft on the helicopter during assembly is critical to vibration-free running. Since the belt-starting method doesn't require an extended starting shaft, it eliminates one potential source of vibration. This is an advantage to a first-time builder.

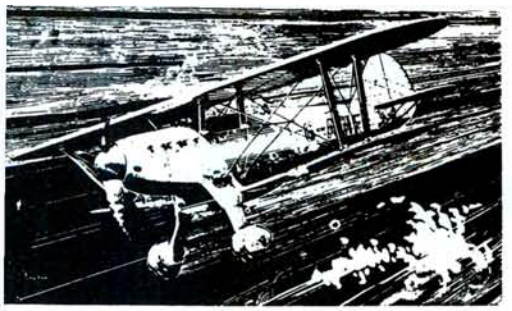
Installation of the main shaft, scissor-arm assembly, swashplate and drive gear went according to the instructions. One step that could puzzle a beginner is the adjustment of the backlash between the pinion and the main gear; there should be almost no perceptible play and definitely no binding. Well, I didn't find enough of an adjustment range to make them bind, so I just made them

(Continued on page 59)

Close-up of tail-rotor assembly. Blade holders are supported by dual ball bearings. Blades and tail fins are of molded plastic.



Basic frame, composed of uprights, landing gear and radio tray. Shown here with engine and main rotor shaft installed.



Golden Age of

by HAL "PAPPY" DeBOLT

THIS MONTH, I'LL complete my discussion of Bonner Specialties and the Digimite proportional system. I've already described the sustained efforts of Howard Bonner and his associates to produce the ultimate R/C system, when the digital concept was still in the embryonic stage and reeds were dominant for multi. Single channel was still extensively used, so the Bonner effort wasn't only visionary, but was also a major accomplishment, considering the expertise that had to be gained in a very short time.

When I was an inexperienced R/Cer, like most enthusiasts, I had little knowledge of what was required for a digital propo system. I hope you can imagine our amazement on first examining the Digimite. A look under the cover of the receiver revealed a multitude of transistors and components, all unlike anything we could have dreamed of. Inside, the transmitter was the same—more components! Compared to our usual systems, the Digimite seemed like something right out of the space program! This was obviously something so new and advanced we had nothing to compare with it. Our needs haven't changed very much, but our I/Cs and chips have become miniaturized.

The first attempt at digital operation was rudimentary and differed in concept from that which we have today. Initial digital investigation had revealed problems with the control interaction and showed that noise and outside interference could affect operation. We needed to eliminate such effects.

Digital uses precisely spaced signal "spikes" for information; the spacing and the shape of the spike determines the servo action. Anything that would disrupt these characteristics would cause false coding and unwanted servo response. In operation, the transmitter generates the signal spikes and the precise spacing. With controls, the pilot varies the spacing, and this, in turn, creates the desired servo action.

Modern digital systems have a "frame" of spikes and pulses; each frame includes all the system's control channels. Many of these frames are generated per second. Each frame is separated from the others by a "sync pulse" that's much longer than a control pulse. The sync pulse allows each frame to have its own identity. This is a safety measure; if one frame is distorted for some reason, the next frame will begin anew, without suffering from the distortion of the proceeding frame. In practice, since the frames are sent so rapidly, a new, correct frame arrives before a servo can react to a "bad" one. Thus, a momentary problem is overcome, and it doesn't affect the control.

Maurice Woods promoted the first Tournament of Champions in Oklahoma City in the early '60s. Winners were a "Who's Who of R/C." **Left to Right:** *Cliff Weirick, Maurice Woods, Phil Kraft and Doug Spreng.*

The Digimite system used a much more sophisticated method to utilize the digital concept. With today's 8-channel system, eight control pulses or spaces would be required, as well as one sync pulse. The Digimite had the eight required control pulses, but it also included eight sync pulses: one between each control pulse. In use, this ensured that any interference would have only a minimum effect on the controls. Naturally, the need for more sync pulses increased the complexity of the circuit, but it apparently solved the problems which confronted designers of that time.

Within a very short time, Jerry Pullen developed the digital concept used today by finding other ways to cure these problems.

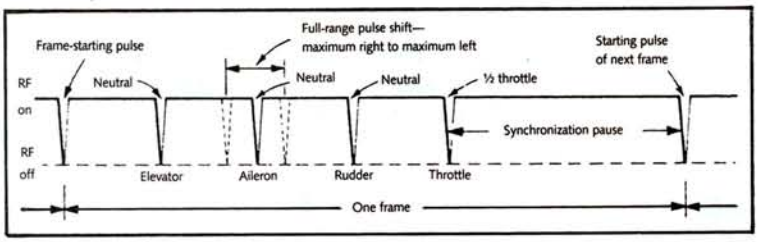
Later on, Bonner produced a 4-channel version of the Digimite, and with this one he used the single-sync pulse concept. Changes were coming fast and furious in those days!

Another feature (which is only now being *talked about* for future R/C systems) added to the complexity. It was felt that an ultimate system should have a "fail-safe" feature. With the Digimite, if legitimate information wasn't received for a quarter of a second, the servos would automatically go to neutral, and the engine servo would cut back to low speed. A new and proper signal would return everything to normal operation. This was one Digimite feature that was of questionable value. The fail-safe needed *power* to operate. Even today, a major source of failure is loss of battery power. Without power, *nothing* can operate, and this includes a fail-safe mechanism. This is still a major stumbling block for designers.

Good examples of how systems became simpler are the basic systems of about 12 years ago. A look inside a Proline "Cadet" transmitter of that era reveals an empty-looking space; a couple of small circuit boards made up the entire circuitry. I've just acquired an Airtronics system whose transmitter has most of the modern "whistles and bells." Today, the simplicity is gone; the complexity of the circuitry in this fine transmitter reminds us of the Digimite. We have apparently

Bonner's Digimite, the ultimate for R/C in the '60s. (Complete story in the text.)

Dick Sarpolus' 2/3-size Live Wire Trainer. (Details in text.)



The modern standard digital coding. The Bonner Digimite added a sync pulse between each control pulse, making a total of eight!

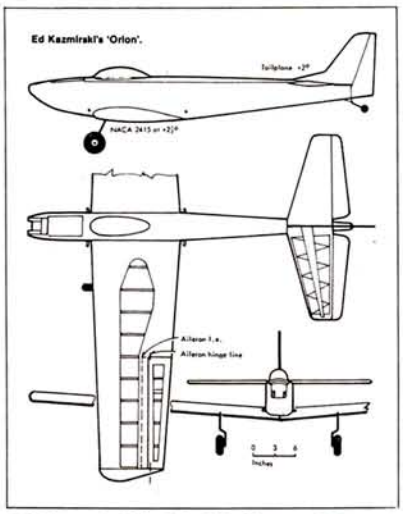
come full circle as far as the number of components required is concerned, but we do get more action!

As I've said before, the servos are the heart of all systems, including the Digimite. For the first time, servos had to contain electronic circuits. Cliff Wierick says that Doug Spreng designed the first digital servo amplifier and, amazingly, the same basic circuit is still used. Cliff tells us that the "Transmite" reed servo mechanics were used for the first Digimite systems, and that he had to design the amplifier layout for them. Cliff's words describe the effort best: "Talk about stuffing 10 pounds into a 5-pound bag! That's an understatement!" Obviously, a major problem with the Digimite system was fitting the multitude of components into packages of a usable size.

Quite soon, Bonner apparently realized the need for updated servo mechanics and he developed a new package. He replaced the Transmite metal cases with cases of molded plastic. Much foresight went into the new design; the servo could be mounted from three of its sides. Additionally, if you wanted an opposite output direction, you simply had to turn the servo around! Even the output was ingenious: First, it supplied the ideal linear action with straight-line movement instead of the rotary we now have. The push-rod connectors were very convenient; they provided length adjustment a la a clevis! Also new were the two output connectors supplied: Two pushrods (such as nose-wheel and rudder) would be attached to the same servo output. I said that Bonner was striving for the ultimate, and the Digimite servo certainly exemplifies his effort.

With the use of the digital-proportional principle, solid-state components, eight individual channels and rechargeable Ni-Cds, the Digimite was certainly one giant step forward for R/C, and the effort put into it is something to marvel at.

Two esteemed R/C pioneers, Howard Bonner and Carl Goldberg, discuss the merits of a wing design in the '50s.



Ed Kazmirski's World Champ Orion. A likely subject for modern performance, with a .45-powered OT design.

So what happened to end the Bonner Specialties operation? It seems that about 1,500 of the 8-channel systems were produced, and that's not many considering the cost and effort it took to produce them. The $615 price tag affected sales, and in an effort to solve this problem, a cheaper 4-channel version was offered, and this sold in larger quantities. Perhaps, with such a major effort at his age, Howard simply burned himself out and the old drive was gone. There was some talk of locking the doors and retiring in a couple of years—not a bright future for the staff! (They began to leave for greener pastures.) Wierick left to form Proportional Control Systems, and he says this was the smartest move he ever made. (I'll tell you about PCS later on.) Howard finally put the business on the market, but there were no takers, so he auctioned it off and retired.

Dick Sarpolus of Shrewsbury, NJ, is certainly an early-bird R/Cer. After the usual stint in FF and C/L, Dick was bitten by the R/C bug 35 years ago. He and a modeling buddy began by each purchasing a kit. There were two choices: the Live Wire Trainer and the Trixter Beam. Apparently, his friend went to the hobby shop first and bought the Trainer Dick preferred, so Dick bought the Beam, because they wanted to try both.

Dick's early R/C trials and tribulations parallel those of many early birds. He flew at Hadley Field, NJ, which, even in those days, already had a history as a free-flight mecca. Does anyone know what 35 years has done for that fine flying site?

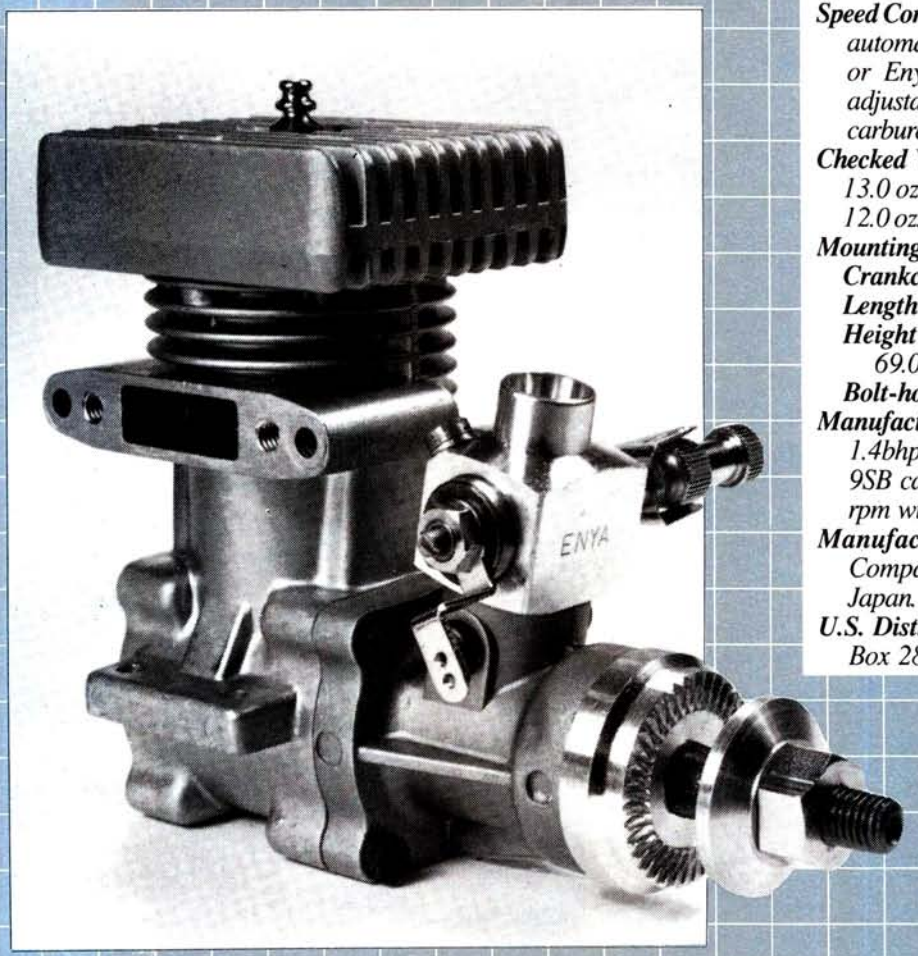
Dick remembers being jealous of the many large R/C models being successfully flown there. His is a tale of tinkering, tuning and trying the "latest" equipment in the hopes of some good flying. Dick describes a launching method that we no longer see. The ground-base transmitter

(Continued on page 106)

Engine Review

by PETER CHINN

ENYA SS50 HELI



Largest of the Enya Super Sport Series, the S.S. 50 is now available only as a helicopter engine. This is the standard S.S. 50 version with Enya's (TN-131H) two-needle-type carburetor.

SPECIFICATIONS

Type: *Air-cooled, single-cylinder, side-exhaust 2-stroke cycle with crankshaft rotary-valve and Schneurle scavenging.*

Bore: *0.8780 inches (22.3mm)*

Stroke: *0.8110 inches (20.6mm)*

Displacement: *0.4910 cu. in. (8.046cc)*

Nominal Compression Ratio (full stroke): *11:1*

Speed Control: *Enya GM-9SB adjustable automatic mixture control carburetor or Enya TN-131H two-needle-type adjustable automatic-mixture-control carburetor.*

Checked Weights:
13.0 oz. (370 grams) w/GM-9SB carb.
12.0 oz. (341 grams) w/TN-131H carb.

Mounting Dimensions:
Crankcase width: *33.6mm*
Length (from driver face): *86.0mm*
Height above CL (less glow plug): *69.0mm*
Bolt-hole spacing: *42.5x18mm*

Manufacturer's Claimed Power Output: *1.4bhp at unspecified rpm with GM-9SB carburetor; 1.3bhp at unspecified rpm with TN-131H carburetor.*

Manufacturer: *Enya Metal Products Company Ltd., Nerima-ku, Tokyo 176, Japan.*

U.S. Distributor: *Altech Marketing, P.O. Box 286, Fords, NJ 08863.*

THE ENYA Metal Products Company is Japan's second-oldest model engine manufacturer, and was established by the Enya brothers in the early '50s. Enya's engine line-up is also one of the world's largest, including more than 80 different models (if one includes all variants of aircraft, boat and car engines that the company has on its current product list). These range from a tiny .049-cubic-inch ½A glow engine and a .06-cubic-inch diesel, to the 2.43-cubic-inch twin-cylinder 3½hp 4-stroke VT-240, which was featured in our September '87 test report.

Not every Enya model is exported to Enya's overseas distributors, but the Super-Sport's popular-size 2-strokes are now widely available, and the SS-50 described here is the top model in this particular group. Presently, it's marketed only as a helicopter engine.

Although some of the smaller, more basic Super-Sport models are geared toward the beginner and sport

THE NEW SUPER SPORT, TAILORED FOR HELO APPLICATION.

flyer, the SS-50 HELI, particularly its GM version with a GM-9SB carburetor, is very much a performance-oriented engine. It has all the essential ingredients of an up-to-date quality-built engine.

Of the three Super-Sport engines that share the Model 6301 crankcase/cylinder-block casting, the SS-50 has the largest displacement. The accommodation of the extra swept volume within the same body casting as the SS-45 has been achieved by lengthening the piston stroke from 18.9mm to 20.6mm. The liner bore remains the same, as does the bore of the casting, so the liner wall thickness is unchanged at 1.25mm. The liner has an orthodox Schneurle-plus-third-port scavenging system. All three inlet ports remain open for 60 degrees each side of BDC. The exhaust port is timed for a blowdown period of 13 degrees and, therefore, remains open for 146 degrees of shaft rotation. The liner is a close fit within the casting, and the casting should be gently warmed if you have to remove the liner.

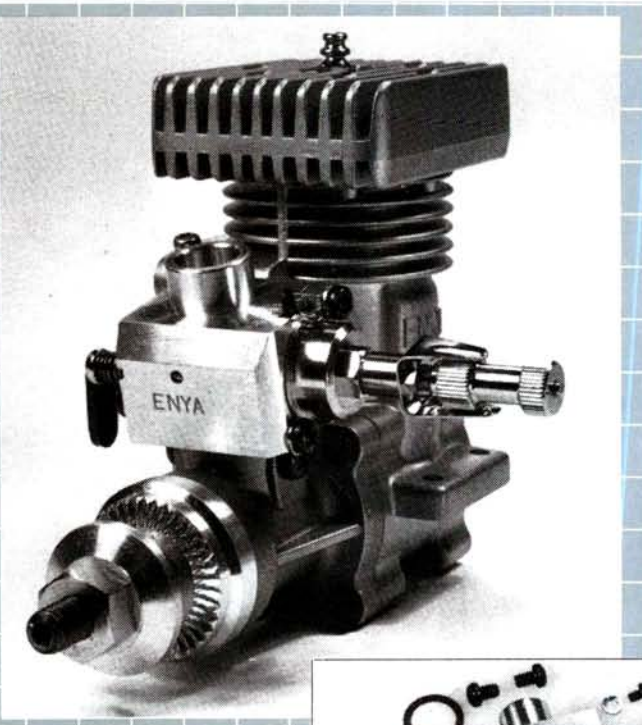
The detachable front housing is a traditional Enya feature. Hefty crankshaft has 15mm main journal. Carburetor shown is GM-9SB type.

The piston is machined from low-expansion aluminum alloy and, to improve wear resistance, is provided with bronze bushes for the closely fitted 5.5mm-o.d. tubular wrist pin. The piston has a conventional compression ring that's pegged to prevent rotation of the ring gap into the ports and weighs 10.3 grams complete with wrist pin. A very sturdy forged-aluminum-alloy conrod, bronze-bushed at both ends, is used. It's fairly short, at 34.6mm (1.68 x stroke) between centers, and it checked out at 5.3 grams. The pressure-cast, heat-sink-type cylinder head has a small, shallow central bowl surrounded by a flat 4.6mm-wide band—*not* a squish-band, since there's approximately 0.060 inch clearance between it and the piston head when the piston is at the top of its stroke. The head has a cast-in brass thread insert for the glow plug, a 0.3mm soft-aluminum gasket and is tied down with six 3mm socket-head cap screws.

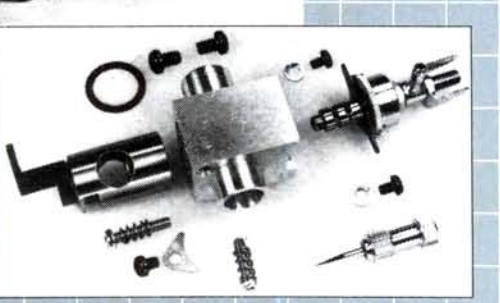
As with most Enya engines, the crankshaft is carried in a separate front housing that attaches to the crankcase with a robust flange and four cap screws. The SS-50 crankshaft has a 15mm-o.d. main journal and a 6mm hollow crankpin on a hefty crankweb,

Compact but sturdy proportions of the SS-50 HELI-GM are clearly shown in this photo. Body casting is the same as for SS-40 and SS-45 models.

Other parts of Super-Sport 50-HELI include heatsink-type head, ringed bar-stock, lo-ex alloy piston with bronze bushes for wristpin.



The HELI-GM version of the Enya Super-Sport 50 has this larger and more sophisticated Enya GM-9SB-type carburetor.



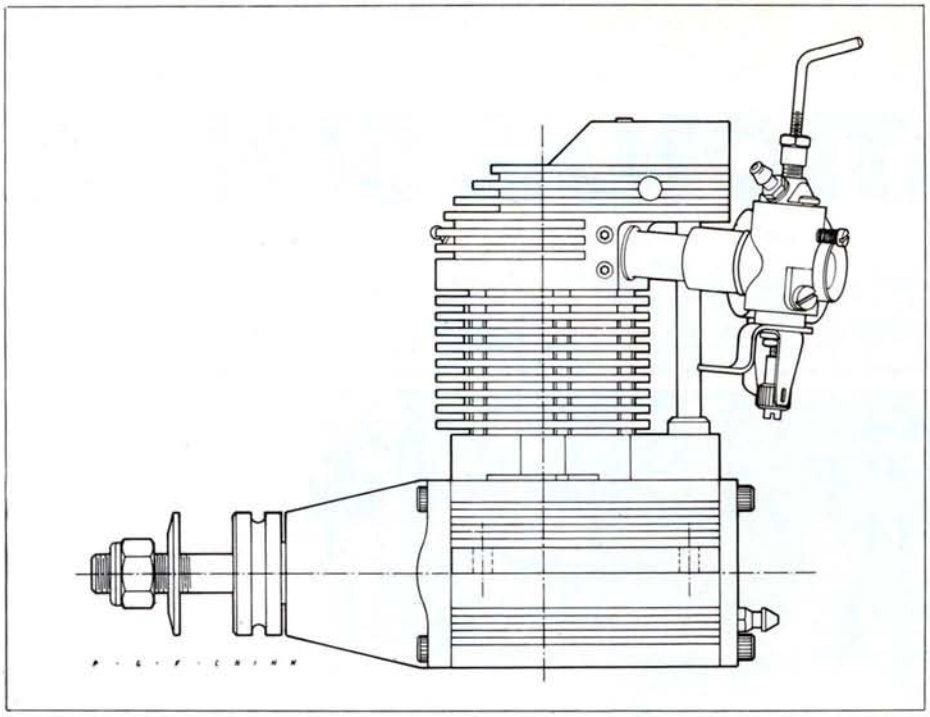
Parts of the Enya GM-9SB carburetor. Heart of carb is manually adjustable, automatic mixture-control valve seen on right, above needle.

which is counterbalanced by cutaway web flanks on each side of the pin. It has a 11mm-bore gas passage that's fed from a 14mm-long rectangular rotary-valve port. This remains open for 195 degrees of crank angle and closes at 45 degrees after TDC.

The shaft runs in a 15x28mm 10-ball steel-caged ball-journal bearing at the rear and a ⅜x⅞-inch seven-ball steel-caged shielded ball-journal bearing at the front. The front end of the shaft has two flats, to which a machined-aluminum-alloy prop driver is keyed. The prop nut has a standard ¼-28 UNF thread.

The Super-Sport 50-HELI is offered with a choice of two carburetors: The TN-131H carb is the familiar two-needle-type; the low-speed needle is mounted in the outer end of the throttle barrel, which moves axially inward as it is rotated towards the closed position, causing the needle to enter the fuel jet and reduce fuel flow. The more complex GM-9SB is similar in design to the GM-type carburetor that's fitted to the Super-Sport 30-HELI-GM engine (discussed in the February '87 "Engine Round-Up"), but it's larger and has an air-bleed screw for fine-tuning the idling mixture.

The more sophisticated fuel-metering system of the GM-9SB carburetor enables it to function with a larger choke size and thus allows the engine to reach a higher power output with this carburetor than with the TN-131H carb. As the specification table indicates, the factory claims 1.4bhp and 1.3bhp respectively.



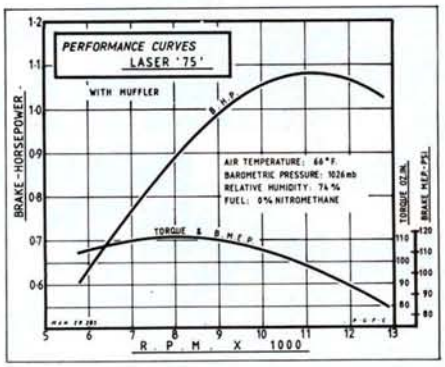
Laser Update

The extended report on the Laser 75 4-stroke-cycle engine in the December '87 issue of *MAN* was our 285th full engine test article. These test reports have always included a full-size drawing of the engine under review, along with a graph showing the power and torque curves plotted from test readings.

Unfortunately, the drawing and graph for the Laser 75 failed to appear in the December article. We know that many engine buffs like to collect these reports, so, to enable them to complete their files, and for those who wish to see the missing material, we're including the drawing and graph with this month's article.

Since the report on the Laser 75 was written, the Laser 4-stroke line-up has been extended to eight models. The smallest engine, the 45, has been joined by the Laser 50. This has the same external dimensions as the 45, but it uses a 0.940-inch cylinder bore, increasing actual displacement from 0.450 to 0.514 cubic inch, for no increase in weight. The manufacturer has announced the largest Laser to date, the 180-V. This, a 90-degree vee-twin, is similar to the existing 120-V and 150-V Laser twin-cylinder engines, but it has a 1.04x1.06-inch bore and stroke, which increases total displacement to 1.801 cubic inches or 29.51cc.

Laser engines, particularly the 75, 90 and twin-cylinder models, are much in demand for scale use. In 1987, they powered the first- and fourth-place



winners in the European R/C Scale Championships, and five of the first sixth-place winners in the British Nationals International Class Scale event. Jeremy Shaw, whose splendid large-scale models have been major attractions on the British modeling scene during recent years, flew two tremendously impressive models during the 1987 season. One of these, his 45-pound Grumman Widgeon, was used to flight-test a couple of prototypes of the new Laser 180-V twin. The other, a 15-foot-span, 75-pound model of the deHavilland Dash-7 four-engined turboprop airliner, has two Laser 150-V engines and two 120-V engines.

With the FAI rule change, which now admits much larger displacement engines for scale use, Laser also has a 25cc (1.5 cubic inches) single-cylinder engine in the works.

For further information on the availability of Laser engines, write to A.G.C. Sales Ltd., London Road, Apsley, Hemel Hempstead, Hertfordshire, HP3 9ST, England.

1988 HELICOPTER ASSOCIATION INTERNATIONAL SHOW

by GREG NEWMAN

THE LITTLE OLE LADY FROM PASADENA MIGHT JUST CHANGE HER MODE OF TRANSPORTATION!

Three of the more than 50 full-size helicopters on display at HAI: a rare Bell 222U and two Long Rangers. On far right is the Circus Circus Flagship.

THIS OBSESSION WE HAVE with things that fly seems odd—even silly at times. Some argue that our interest is innate, and that human beings have always looked with envy and fascination at birds and later at aircraft. Perhaps we *are* born with a love of all soaring things, and now the hectic nature of our everyday lives encourages us to gaze wistfully at all free fliers.

No amount of terrestrial craziness could ever turn off my upward-directed "radar." Only moments after returning to the recovery room with my wife after the birth of our second child, my ears alerted me to the arrival of a turbine helicopter. The room's long, narrow, horizontal windows were about seven feet above the floor. To see the beautiful green-and-white Twin-Star on final, I had to quickly grab a chair, place it against a clear spot on the wall, and then climb up. My superlative-filled description to my understanding wife must have been good, because on my right I soon discovered a nose-against-the-window nurse, who had also clambered up to see the show!

I love all flying things. Birds, planes, balloons—even bats!—all defy gravity in their own way. They have a unique aerial

A rare Bell 47H in museum condition; an excellent subject for the dedicated scratch-builder.

Perhaps the ultimate display model: a 1/3-scale V-22 Osprey.

perspective that reveals the world in its most uncluttered and pristine form. On a clear night, a city like Los Angeles becomes a sea of glittering jewels; it's breathtaking and endlessly fascinating. Attaining this vantage point is expensive and sometimes dangerous, so for many of us, R/C model aircraft are a wonderful compromise. We can let our imaginations slip their earthly bonds and "dance on silvered

Sponsored by Enstrom Helicopters, Voyager pilots Jeana Yeager and Dick Rutan, were on hand to sign posters and copies of their new book.

wings" for a fraction of the cost of going up in person, and no one has ever died in the crash of an R/C plane.

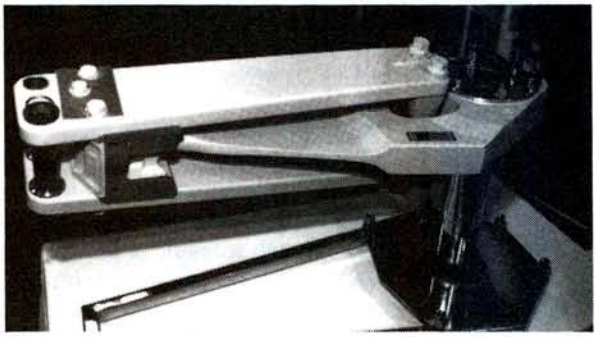
Nothing holds me as spellbound as the sight of a *helicopter* in a sustained hover. It's magic—but it's no cheap thrill, as the cost of a Jet Ranger tops $400 an hour. My pockets aren't that deep, so I had to find an alternative to hanging around airports in search of an occasional blast of adrenaline. Fortunately, I found the *R/C* helicopter!

My love of helicopters seems understandable: The R/C heli is expensive, but still affordable. Building one properly requires meticulous attention to detail. Flying it properly requires *a lot* of practice, but there's never a shortage of veteran pilots who give you extra advice.

But being in love with my model's full-size counterparts made me yearn for a scale fuselage to hang on my bird—a fuselage with as much scale realism and detail as was practical. The available scale bodies are what the airplane people would call "stand-off" scale. I like to fly my heli up close, where you can see more details than the off-the-shelf machine has to offer, and the only place to find that kind of detail is on a full-size helicopter.

For a heli enthusiast, two of the best things about living in Los Angeles are the mild (year-round flying) weather and the Helicopter Association International (HAI) trade show every two years. The HAI exists to promote the growth of the civilian helicopter industry, and its January '88 show was held in the Anaheim Convention Center in California.

The HAI show is more than just a spectacular trade show; it's five days of seminars, classes and information followed by two days of static display. I was most interested in the static display. With our *Model Airplane News* press passes, my assistant and I registered and then waited for the official opening ceremonies. The celebrity hosts were Ernest Borgnine, Jeana Yeager and Dick Rutan, who all arrived in an Enstrom helicopter and were ushered in by a marching band! These folks really know how to kick off a show!



A section of the NBS Elastomeric rotor head flying on the Aerospatiale A-Star, Twin Star and Dauphin II helicopters. It's 95 percent fiberglass composite material!

Well, the ads and brochures promised interesting displays, but what we saw was dazzling. On entering the main hall, I was immediately struck by a booth with a rainbow-painted Hughes 500D perched on *top* of it. (The 500 was the flagship of a South American charger service.)

Booth after opulent booth, displaying everything from avionics to turbine engines to interior packages to complete helicopters, were there to boggle the mind. When I say "booth," I'm not talking ten feet of curtain and a table; some cost over half a million (yes, *million*) dollars, and looked every nickel of it.

MBB trotted out both the exec and the air-ambulance versions of its 117 helicopters in

A full-size mock-up of the EH101 was a big *hit!*

A training simulator that uses an electrically powered, mechanically tethered Heim Star Ranger that you fly from the cockpit (seen in the background) using full-size controls.

lavender-and-pale-blue metallic paint schemes that would make even a concours aficionado drool. Sit in their helicopters and dream, or step into one of their private conference rooms and sign the papers for a new bird—*if* your wallet is fat enough! Getting this close to these particular machines gave me a chance to collect details for possibly building the Schluter* BK117 kit.

Boeing's booth contained several interesting display models. There were static versions of the CH-47 Chinook and the CH-46 Sea Knight. The CH-46 Sea Knight model was about the same size as the new flying tandem rotor R/C heli from the Hirobo/Gorham* team. Gaining the most attention at Boeing's display was the animated model of the new V-22 Osprey. The Osprey rose from a mirror-covered base with its wings and rotors folded. Having risen, the wings rotated into position, and the rotors unfolded to horizontal and began to spin. The wings then tilted to the forward-flight position and the aircraft slowly rotated through a couple of back-to-back 180s. After this, everything folded up, and the Osprey disappeared beneath the mirrors. This was a spectacular masterpiece of mechanical engineering, and it's one of only two displays like it in the world. I can hardly wait until someone comes out with a *flying* version of this one!

The beautiful Aerospatiale Dolphin is what the USCG now flies. Excellent model detail, including full interior.

Also from Sikorsky: a Sea Hawk variant, proposed for the Coast Guard.

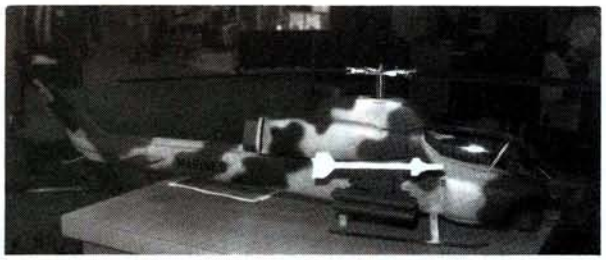
One of the things that impressed me while I walked through this immense dreamland for helicopter maniacs was how, in their presentations, the large corporations used finely crafted (usually 1/10-scale) models to augment, if not replace, the full-size machine. By using models, they're telling us that it's often physically impractical, if not economically unfeasible, to use the full-size machine for some purposes. Isn't that what nearly everyone in the R/C sport is saying? I know that if I had a couple bizillion dollars, I'd be spending my fun time in the cockpit! In a funny way, these multi-billion-dollar corporations have legitimized (as if we needed them to!) modeling. They use models to sell full-scale helicopters, and we use models as substitutes for full-scale helicopters.

This compromise was best illustrated by a company using a model in a very realistic way. Their product was a training aid/simulator where the student sits in a full-size cockpit with full-size controls and flies a mechanically tethered, electrically powered Heim Star Ranger. The pilot "flew" the machine into a hover (with full tail authority) and then into forward flight in a large circle. I didn't get a chance to try it, but I know that it was much more difficult than it looked. This is as close as R/C and full-size get.

The four-acre Anaheim Convention Center was large enough for all the display booths and over 50 full-size machines. The smallest was the Robinson R-22, and the largest was the Bell 412. Most of the machines were open and available for testing by enthusiastic visitors. I climbed into the back of an executive-equipped Bell 222. I closed the door, settled back into the fine "Corinthian Leather," listened to the stereo's soft elevator music and dreamed of beating the L.A. traffic in this baby. When my 1/8-scale 222 is finished and flying, I'll always be able to put myself into that imaginary back seat for a plush ride!

This was very heady stuff, and after about seven hours of it, my buddy and I decided to hit the road. I returned home with 12 rolls of exposed film, a fistful of business cards, literally 25 pounds of literature and aching feet.

At the Aerospatiale booth, I picked up their 1988 calendar, on which are printed all the U.S. events pertaining to the helicopter industry. I saw that in February there was to be a meeting of the Navy Helicopter Association in San Diego, CA.



Above: *State-of-the-art laser-guided blade-tracking device is demonstrated on this 1/10-scale Lynx.*
Left: *My personal favorite: a Bell AH-1 "W" in Marine uniform at 1/10 scale.*

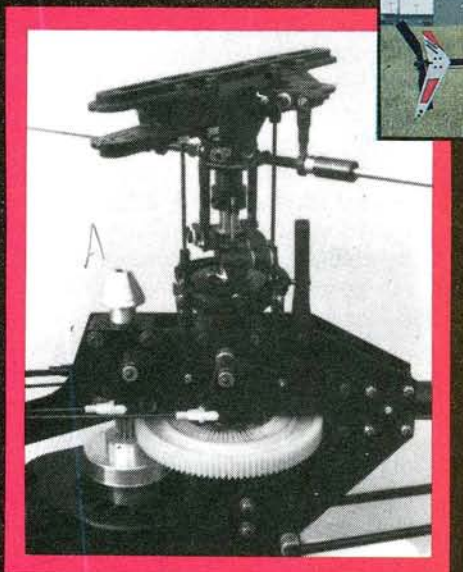
With visions of Dauphins, Seahawks and Cobras dancing in my head, I picked up the phone and called Don Turley, the Director of Marketing for Aerospatiale, and I asked him if I could attend. Don helpfully arranged a pass for me. I was off again!

The Navy Helicopter Association's display was different from HAI's in many ways. First, it was much smaller; second, there were no full-size helicopters on display; third, only

(Continued on page 106)

SCOUT 60

HIGH-QUALITY MECHANICS, SNAPPY LOOKS AND GREAT PERFORMANCE.



Composite head is strong and lightweight. Note 45-degree offset swashplate.

by PAUL TRADELIUS

WHENEVER I THINK OF German-made products, I envision a Mercedes, a Porsche, a BMW or a Schluter helicopter—all of which are reputed to be the "top of the line" in their fields. Dieter Schluter—the "father" of R/C helicopters—has continued that German tradition, producing helicopters of only the highest quality.

In building his helicopters, he has two basic aims: to continue a proven design that works well, and to keep pace with improvements in technology. Mr. Schluter doesn't radically change his designs in an attempt to find the "perfect"

The Scout is a very clean-looking machine. Its trim lines lend themselves well to colorful paint schemes.

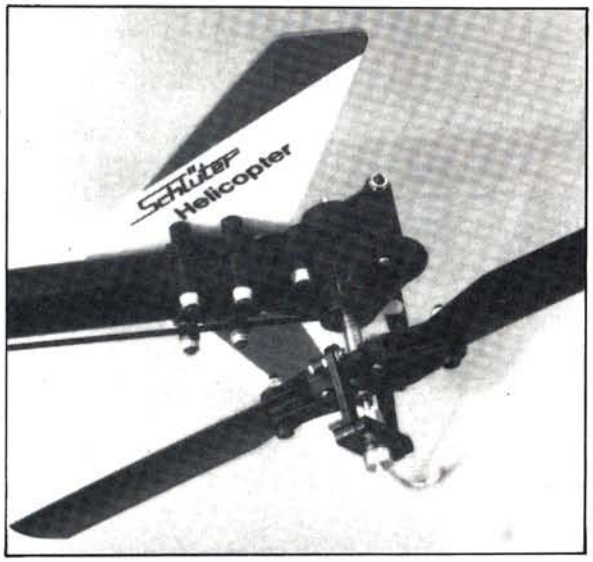
machine. He prefers the "building-block approach"—staying with proven designs of the basic structure, while constantly improving specific areas of the helicopter. The most recent additions to his long list of helicopters are the Scout 60 and the smaller Junior 50.

Since the Champion is still very popular, I was surprised at the introduction of the Scout 60, which is distributed in the U.S. by Robbe Model Sport, Inc.* However, Mr. Schluter is always looking for ways to improve his product—and we should be glad that he is!

The construction of the Scout 60 is so straightforward, using the excellent instruction booklet and exploded diagrams, that I'll spend more time discussing the *unique* features of this helicopter.

Unique Features

• Rotor Head: One of the first things you'll notice about the Scout 60 is its new head. Made largely from a composite material to reduce weight, it also appears to be a very robust design of tremendous strength. It has the basic, compact, low-slung flybar design that we've seen in the Champion, but it now incorporates two flybar control arms for increased control. The blade holders are made in two halves, each with molded areas to hold the axial and thrust bearings. Bell-mixer levers then attach to the blade-pitch levers, which in turn bolt to the main blade holders. This produces a very compact and slop-free head.



New tail rotor has optional gear ratios and can be reversed for scale applications.

• Swashplate: The swashplate is larger than those of previous designs, and it's also made of composite materials. Incorporating an in-line design, the swashplate is rotated 45 degrees, allowing four bellcranks mounted outside the chassis a direct line to completely control all swashplate movements. Control of the swashplate is thus very rigid and slop-free, and the load on the servos is balanced. As a by-product of this design, it's very easy to adapt this swashplate for multi-rotor applications.

Unlike earlier Schluter designs, the swashplate can be moved in the vertical axis to control collective pitch. This eliminates the separate mechanical parts for collective control, and it provides a very precise and powerful response, since the power of two servos is applied to the swashplate. It also reduces the number of moving parts, so simplifying the overall construction. The washout unit is also rotated 45 degrees to allow the flybar paddles and main rotor blades to receive the cyclic commands in the usual way. Obviously, much research went into this radical new design—another Schluter first.

• Servo Mounting: To control the movable swashplate, the servos must be mounted in such a way that both the aileron and elevator servo can be used to control the swashplate's cyclic requirements and also the collective requirements. This is accomplished by having all three of the servos rotate on a specially designed tray. The forward servo (collective) has one side of its output arm held in a stationary position through a pushrod, which is attached to the metal frame. This forces the servo to rotate when a collective command is given. This servo is connected to both the aileron and the elevator servos, again forcing them both to rotate an equal amount to supply the collective command to the swashplate. Because this mixing is purely mechanical, no electronic mixing by the radio is required.

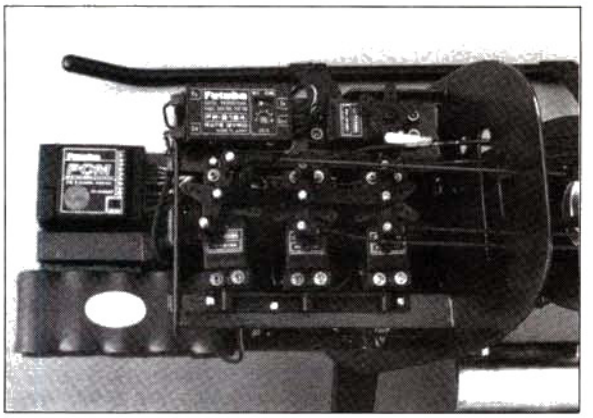
The aileron and elevator servos also operate independently for cyclic commands, having a direct "push-pull" input to the swashplate through their respective bellcranks.

• Composite Landing Gear: This is the first Schluter design to offer a composite landing gear, and it's really needed. A metal landing gear will bend during hard landings, but this gear will take the shock and appears to be almost unbreakable. There has been no claim that this gear is *unbreakable*, but I know it will take *a lot* of punishment.

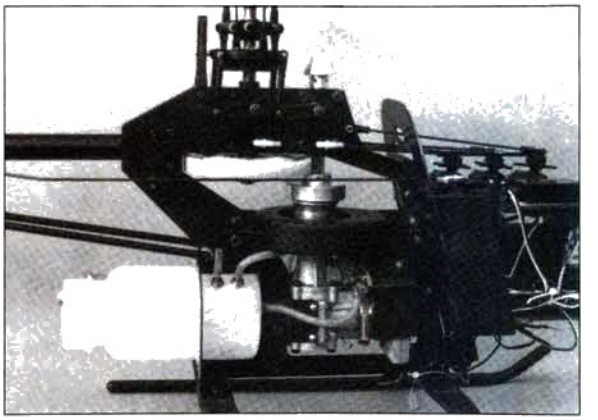
Although there are easier ways to make the landing gear, Mr. Schluter also did us another favor by designing them with an internal mounting system so that the composite material won't wear out when it's used on a hard surface. The struts attach only to the top of the skids, thereby leaving the entire metal skids to touch the ground.

The Flex-Strut landing-gear system is also available as an add-on if you have the old-style landing gear, and it comes in two sizes for large and small helicopters.

• Tail Rotor and Fin: The same basic design of tail rotor has been used on all Schluter helicopters for as long as I can remember, but this new design has several improvements. The tail-rotor housing is again made of composite materials, with molded areas to hold the dual bearings on both the input and the output shafts. To vary the tail-rotor speed, several different, optional, gear ratios are available, but I'm not sure what advantage they have over the stock gears. For scale applications, the tail-rotor housing has a rounded rear section, and the direction of tail-rotor rotation is also reversible.



Unique servo-mounting tray provides collective-pitch changes by rocking all three servos.



Right side shows fuel tank, engine and cooling-fan layout.

The new two-part housing mounts directly to the boom without needing any other clamps, and it also holds the large metal fin. The metal fin is another plus in all Schluter designs, and, together with its skid extension, it really protects the tail rotor from damage during tail-low landings.

• Horizontal Stabilizer: The horizontal stab is made from two flybar paddles and mounted to the boom in such a way that the angle of attack can be changed. Although I haven't yet experimented with different settings, I imagine that different angles could affect the flight characteristics during very fast forward flight. But during slow forward flight, as well as during a hover, I think the downwash from the main rotor would be dominant.

Standard Schluter Features

Each Schluter helicopter has always incorporated the best design features of its predecessors, and the Scout 60 is no exception. Time-proven features include:

• Metal Chassis: Not only are the side frames made of metal, but they are of a flat vertical design that withstands a tremendous amount of force without bending. This is one of the strongest helicopter frames on the market.

• Fuel Tank: The large clear fuel tank is mounted to the rear of the chassis, where the remaining fuel supply is easily visible in flight. However, because of problems brought to Mr. Schluter's attention with the earlier design, the fuel fittings for the tank are new and improved. The older fuel fittings could crack or break, but for added strength, these new ones are machined from a single piece.

Large, attractive canopy is easy to remove and seals the radio area from dirt and fuel.

• Fan Shroud: The very efficient two-piece fan shroud is made of a durable plastic that doesn't need adjusting to fit the fan perfectly. I've flown many Schluter models in the Texas heat, and I've never had a problem with overheated engines.

One improvement has been made to the cooling system, i.e., to the plastic duct that directs the air from the fan area to the head of the engine. The duct used previously in Schluter helicopters was made of a fairly brittle black plastic that had a tendency to crack or break off in flight. The new material is clear (but can be painted) and made from a more durable, resistant plastic. The new duct is also available as an add-on for the older Schluter helicopters.

• Main Gear: Schluter main gears have always had a good reputation for durability. They appear to be made from a nylon-type

(Continued on page 86)

Helicopter Challe

by CRAIG HATH

Helicopters seem to be like an ugly child: Only a mother could love a face like that! But what a joy to handle one of these machines when they really start to come together and perform properly.

WELCOME TO ANOTHER in our series about setting up and trimming out the ideal model helicopter. Last month, we worked at providing a good foundation with the collective-pitch mechanism. This month, I'll pick up where I left off.

Now that you're ready with your collective-pitch linkage and have had a chance to fly your machine, you may have discovered that your perfect setup is less than perfect. Some gremlins may have crept in to foul the relationship between the throttle and the rotor disk, or the rotor disk may just be out of sync with the rest of the machine.

In case you become disoriented, it's a good idea to let your helicopter glide past you slightly when you first learn to re-enter hover.

Let's "fly" a simple circuit on paper, and analyze the way the ideal helicopter would respond to various flight conditions. The term "circuit" refers to a sequence of flight maneuvers: takeoff to hover, hover to forward flight, full-throttle forward flight, transition back to hover, and landing. This exercise will give examples that we should try to follow with our real machines, and it may help to solve some particular problems that may arise relative to trim.

Takeoff should be a smooth transition, from the application of power all the way to hover. Pay attention to the point at which the model leaves the ground in relation to the position of the throttle/collective stick on the transmitter. The helicopter should hover at the mid-stick throttle/collective position. This is important, because the stick position affects the performance of many of the features built into modern helicopter radio systems. The importance of this increases with the complexity of the radio.

Missing the mid-stick position at hover can be the result of an incorrect pitch curve, an incorrect throttle curve, or even both. If this sounds like hocus-pocus to you, try to bear with me and I'll attempt to explain it in simple terms. The power source (the engine) and the pitch of the rotor blades need to be matched for optimum performance. Because of differences that are unique to each model, it's impossible for manufacturers to give exact settings that will give consistent results. For example, your instructions state that the hover pitch should be set to 4 degrees, and the throttle barrel should be open half way. When you fly the helicopter, it seems as if the rotor speed is much too high at hover, and the hover point is below the mid-stick position. To get better results, you must be willing to deviate from the recommended setup.

Flying a circuit like this is a sure way to find out a lot about the setup on your machine. If you're in the early stages of learning, don't try this, unless you have help standing by to get the machine down.

Getting back to the relationship of the engine to the pitch of the rotor blades: To determine which factor is at fault (throttle curve, pitch curve, or both), I continue the circuit to get a better feel for the helicopter itself, all the time paying attention to the sound of the engine and the speed of the rotor disk. My idea of a well-trimmed throttle/collective system is one that maintains a good crisp throttle response and a constant rotor speed through all flight attitudes. As you ease the helicopter into forward flight, try to note how the engine sounds and reacts. Also, notice whether the rotor speed changes significantly or not. A lot can be learned from the transition into forward flight. Make sure that you've set the fuel mixture properly, too, as this will have a big impact on your results; just a little on the rich side (producing a little smoke from the muffler) is just right.

Now that you're in forward flight, pay attention to the sound of the engine and check the throttle response. To me, "forward flight" means cruising around at about half throttle or a little more, but some think the throttle must be "wide open or nothin' "! Try the cruise technique some time, and see if the machine settles into a much more predictable and enjoyable attitude. For certain maneuvers, I occasionally open the throttle all the way, and especially to check the top-end rotor pitch and fuel mixture.

Charlie Sprawl of Las Vegas learned to enter and exit forward flight without much trouble, once he'd been given some tips on setting the relationship between throttle and collective.

Smoothly advance the throttle to fully open and again notice the engine sound. Pay attention to the rotor speed. If either sounds overloaded, or if the engine "sags" and the smoke disappears, pull the throttle

nge

Photos by Craig Hath and Bob Pickens.

back down immediately. For the most part, full throttle will confirm that you have the top-end rotor pitch set correctly, as long as the fuel mixture is in the ball park. Once again, we're looking for a constant rotor speed, and the only area for deviation is a slight increase in rotor speed from normal forward flight to full-throttle forward flight. If the rotor speed drops at all, you'll have to reduce the amount of top-end rotor pitch.

At this time, our hypothetical helicopter is eating up sky at a fantastic rate! In an effort to save valuable adrenaline, cut the throttle back to "cruise" and allow the helicopter to slow from warp speed, Scotty. Check that the rotor speed did, in fact, remain constant as you pulled back the power. In some cases, the rotor speed may increase as you pull off the throttle. I'll discuss this in more depth when I move from forward flight back to hover.

At a reasonable altitude, fly your ship to a point downwind (around 50 feet) and line up for an approach back to hover. As you pull the power back and begin your descent, notice once again that the rotor speed remains constant. If you feel that the rotor speed is beginning to increase and the ship is starting the descent properly, it's a sure bet that you've applied too much throttle in the lower half of the stick throw.

The possibility exists for two other conditions: First, the throttle may be set properly, and the rotor pitch may be set

COLLECTIVE PITCH/THROTTLE RELATIONSHIP TROUBLESHOOTING CHART

SYMPTOM	USUAL CAUSE	CURE
Hover not at throttle mid point.	Pitch curve or throttle curve or both	Try adjusting the pitch hover point first, then the throttle hover point. Throttle should be crisp, with correct rotor speed.
Engine overloads with application of throttle entering forward.	Too much pitch on high end of throttle stick, or mixture incorrect.	Reduce total pitch or correct fuel mixture.
Engine overspeeds on application of throttle entering forward flight.	Not enough pitch on high end of throttle stick.	Add top-end pitch.
Rotor speed drops in forward flight.	Too much top-end pitch.	Reduce top-end pitch.
Rotor speed greatly increases in forward flight.	High-end pitch too low.	Increase high-end pitch.
Engine quits smoking and sags in forward.	Mixture too lean.	Richen mixture.
Engine overloads and rotor speed drops at full throttle.	Too much total pitch on high end.	Reduce top-end pitch.
Engine and rotor overspeed at full throttle.	Not enough total pitch at high end.	Increase total pitch at high end.
Rotor speed decays slightly and engine smoke increases at full throttle.	Fuel mixture too rich on high end.	Lean high-speed fuel mixture.
Rotor speed increases as throttle is reduced; helicopter descends normally.	Too much low-end throttle.	Reduce idle trim, or decrease point setting of HI-idle.
Rotor speed increases as throttle is reduced; helicopter drops quickly.	Too much low-end rotor pitch.	Increase low-end pitch or modify pitch curve to reduce low pitch gradually.
Rotor speed decays as throttle is reduced; helicopter descends normally.	Not enough low-end throttle; throttle reduced too quickly.	Increase idle trim or increase point set of HI-idle.
Rotor speed decays as throttle is reduced; helicopter will not descend.	Too much low-end pitch.	Increase negative pitch at low-stick position.
Helicopter returns to hover and engine sags.	Engine fuel mixture lean or top-end pitch too high.	Richen fuel mix or decrease top-end pitch.
Helicopter lands and engine will not return to smooth idle.	Improper idle mixture; could be too rich or too lean.	Adjust idle mixture.
Helicopter lands and engine will not return to idle for long period of time.	Engine overheating or idle mixture too lean.	Check top-end pitch or high-speed mixture. If problem persists, adjust idle mixture.

incorrectly. For instance, if, as you begin to pull the power off and the rotor speed decreases, the ship stays at the same altitude (as though it's floating), you must reduce the amount of rotor pitch with the stick in the lower position for the machine to fall into the descent. Note this if you're just learning to get into and out of forward flight. The effect can be very hair-raising, and it can hamper your progress, because it makes the transition back to hover very difficult to control. The whole process is so much easier to master with the correct setup, that you'll wonder what all the trouble was about!

The second circumstance is the opposite of that just mentioned. When you begin the descent, the rotor speed might remain the same or decrease slightly, but the helicopter immediately falls out of the sky. In this case, the main rotor pitch is being taken out too quickly in the lower stick position. In other words, you're using too much negative pitch.

The last part of our circuit involves returning to hover and landing the machine. Having returned to hover without incident, the last step is to set the machine on the ground. Notice whether the engine returns to a smooth 4-cycle idle, or if it seems rough and perhaps a little too fast. This can show if the engine is running at the proper temperature and mixture setting. If the engine won't return to a normal idle after a full circuit, there's a good chance that it's being overloaded, either from too much pitch or being run too lean. Sometimes, the culprit will be the idle mixture, so be careful when making adjustments.

If you have the resources, run the helicopter on a stand like this one. You can get a good feel for the collective-pitch settings and the mixture settings on the engine before actually letting it go on its own. It's a good idea to have a helper standing by.

I'll summarize the ideal circuit, and re-state briefly what we're looking for. Take off smoothly into a stable hover with the throttle stick in the mid position. Shift into hover with the rotor speed constant and the engine running crisply. From forward cruise, advance to full power, making sure that the fuel mixture is correct and that the rotor speed remains constant or increases slightly. Return to

This photo shows a good place to start your approach back to hover from forward flight.

cruise and set up for final approach. Notice that the helicopter starts a predictable descent, and that the rotor speed doesn't change. Land the helicopter; the engine should return to a smooth 4-cycle idle.

All of this sounds great, right? How do you get your machine to perform this way? Well, the first step is to determine what causes your particular problem, and I've developed a troubleshooting chart. Once you've discovered what your problem is, you can discuss the possible cures. Owing to the diversity of available radio systems and helicopter types, any discussion of the solutions to the collective-pitch throttle relationships will be lengthy, so I'll wait until next month to talk about this subject in detail.

Next month, I'll look at some of these techniques:

- Setting the throttle so that it opens and closes at the same points as it does now, but varying the middle position using differential throw.
- Setting up the collective-pitch curve the way you want it, using mechanical and electronic techniques.
- How to work around the limitations of your radio system and helicopter with regard to achieving a constant rotor-speed setup.

Some of you more adventurous types may want to tinker between now and next month's article.

This information is the foundation of a great flying helicopter. When you've mastered the basics of the set-up, you'll be able to modify them to get your machine to handle specific maneuvers better and more predictably. A good example of this would be changes to the pitch curve for performing full-down autorotations or truly axial rolls. Since we're searching for compromises that will allow us to keep our machines as flexible as possible, a little study and experimentation will pay off big in the long run. See ya next month!

KALT BARON 30 MX

(Continued from page 39)

as close as the bearing-bolt spacing would allow, and the backlash wasn't excessive.

Assembly and installation of the tail-rotor gearbox and tail boom also went well. Be very careful when bonding the tail-rotor bearings to the gear shafts with CA, because if you use more than just a small drop, it could work its way into the bearing in seconds. I used Loctite* 242 on the tail-rotor hub instead of CA, just in case the hub has to be removed for servicing. When installing the tail boom into the side frames, I found that I had to slide the tail-rotor gearbox and drive wire backward for clearance. When the boom had been inserted, I could slide the drive wire forward until the coupler fit over the bevel-gear shaft. I like the method of keying the tail-drive wire into the coupler with a 90-degree angle, because this is more secure than having a straight piece of wire held by setscrews.

The servo tray must be glued together from a couple of die-cut, light plywood parts and a hardwood block. This tray and the lower front tray were given a coat of Hobbypoxy* paint for protection. My radio is a Circus Hobbies JR Century VII helicopter system. I installed four JR-501 servos, plus a fifth JR-401 ball-bearing servo on the collective-pitch function. The Baron instructions don't even mention the use of a tail-rotor gyro stabilizer, yet almost everyone uses one these days, and should. I use the JR model 110BB, which I mounted on the lower tray, just

(Continued on page 66)

UNITED STATES ARMY AVIATION MUSEUM

A Scale Modeler's Mecca.

by DICK SARPOLUS

THE OFFICIAL START of U.S. Army Aviation was June 6, 1942. On this date, each Army Field Artillery Battalion was authorized to use light aircraft as aerial observation posts for the adjustment of artillery fire. Each battalion was assigned two aircraft, two pilots, and one mechanic; the aircraft were the now well-known and historic Piper Cubs, or their equivalents.

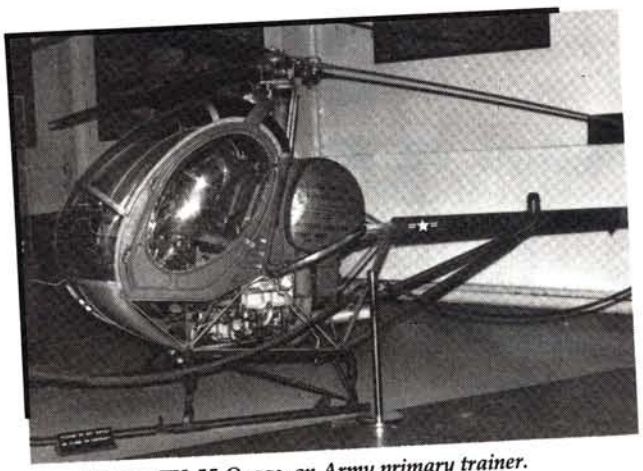
The Army rapidly learned that the small light aircraft did a great job. By the end of World War II, Army aircraft were being used in all theaters of operations and doing much more than directing artillery fire. They evacuated the wounded, acted as couriers and radio relay stations, and served as command liason vehicles.

After the war, the Army lost interest in aviation activities, but the start of the Korean War, in 1950, saw the return of airborne observers directing the Army's ground-artillery fire. Korea's rough landscape made observation from the ground difficult. As in World War II, the Army aircraft soon began performing additional missions, such as battlefield illumination and aerial photography. By this time, helicopter development had progressed to the point that they could be used for military operations.

Because the helicopter can fly like an airplane, but take off and land vertically in a small area, they were sent to the war zone as quickly as they could be built and the personnel could be trained. The first helicopters used in Korea were the H-13 and the H-23, followed by cargo versions like the H-19. These aircraft moved men and equipment rapidly, and saved thousands of lives by quickly evacuating the wounded.

Another chapter in Army aviation history began in 1961, when the first Army

Hughes OH-6A, as used by the Army's Silver Eagles helicopter demonstration team.



Hughes TH-55 Osage, an Army primary trainer.

Piasecki CH-21C Shawnee; large twin-rotor aircraft, the Flying Banana.

Photos by Dick Sarpolus.

helicopter companies were sent to Vietnam to assist the RVN Army. The 1st Cavalry Division, Air Mobile, and thousands of Hueys compiled a distinguished record there.

The Army's Aviation Center is located at Fort Rucker, AL. It was established to show the history of the Army's development of air support for ground operations. This place is "Helicopter Heaven" to rotary-wing enthusiasts. What must be the world's largest helicopter collection is combined with a large number of fixed-wing aircraft, all representative of the aircraft used in U.S. Army activities. The Museum's aircraft collection is displayed in four large buildings and in a large outdoor area.

Of particular interest are the numerous one-of-a-kind experimental helicopters. Fortunately, the Army aviation specialists had the foresight to save these aircraft so they can be seen and enjoyed by all aviation historians and hobbyists. It's interesting to get close to one of the most recognized helicopters, a Bell UH-1 Huey. Bell has produced thousands of them for the military, and they've been used in many war movies. How many people have ever seen a Cessna YH-41 helicopter; or even knew that Cessna had built a chopper? How about a McDonnel XV-1 Convertiplane? Or a Lockheed helicopter; the tough, impressive AH-56A Cheyenne? All these machines, and more, provide a close look at aviation history.

There are plenty of well-known aircraft on

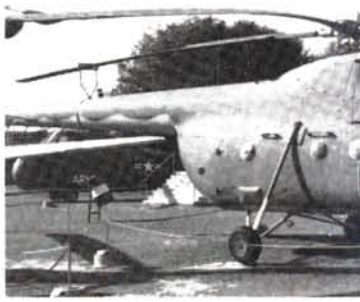
YH-30, a small, compact, twin-rotor helicopter.

A model of the Fairey Rotodyne VTOL aircraft; a civilian project for 70 passengers, to be flown as a helicopter or an autogyro. Was a full-scale one ever built? I don't think so.

Lockheed XH-51A, experimental rigid-rotor helicopter; very sleek design.

display for fixed-wing fans: the sleek Ryan L-17B Navion; a Cessna L-19 Bird Dog (a favorite with modelers); the rare Boeing YL-15 (I'd love to get to work on an R/C version of this one). Several early radio-control target drones are also on display, with two-and four-cylinder engines that look suitable for today's quarter-scale models. Today's quarter-scalers are bigger than the early R/C QQ-2A Radioplane target aircraft. Could a one-to-one scale model, full-scale/scale, for R/C contest use be made?

I could go on and on. This museum really impressed me, but I do have one criticism. Some of the display signs should have provided more information on these rare aircraft. Only the manufacturer's name and/or the military designation of the aircraft appeared on most signs, but an informative brochure would make a Museum visit more enjoyable and profitable.



My tour guide was Sgt. Nick Nicholson, an air traffic controller and R/C enthusiast. We talked at length about R/C projects. If you're an aviation fan, particularly a helicopter enthusiast, plan a trip to Fort Rucker to see the Army Aviation Museum. You'll love it, and you'll probably get plenty of new ideas for modeling projects.

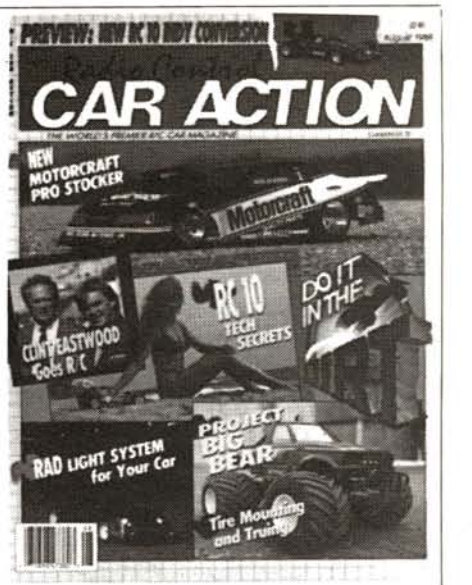
Bell YAH-63 was an entry in the Army's Advanced Attack Helicopter Competition. This was won by the Hughes (now McDonnell-Douglas Helicopters) Apache, so Bell's goes in the Museum.

Boeing Vertol YUH-61A was an entry in the Army's Utility Helicopter Competition. Sikorsky's Blackhawk entry was the winner; Boeing's ends up in the Museum.

Lockheed XH-51A Compound, u Scary!

Russian MIL MI-4 Hound. Now how did this one get in our Museum?

engine hung on a stub wing for more forward speed.

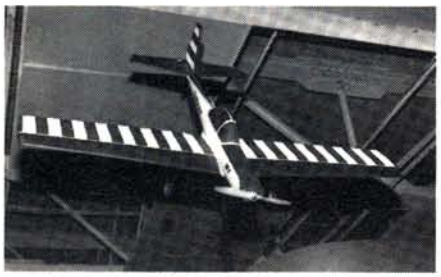


Quiet Flight

by JOHN LUPPERGER

IN APRIL, I WENT TO the number-one trade show—Toledo, OH. It was both exciting and disappointing. The disappointing part was that there were very few *new* sailplane goodies, but I was excited to find that most of the new items at the show were oriented towards electric flight.

There were so many new products for the electric enthusiast that I'll have to spread this report over the next two issues. If ads for these items start appearing before my article for the next issue is due, I'll probably cut my report short. It's impossible for one person to see *everything*, and I hope that any manufacturers I leave out will send me information on their new products.



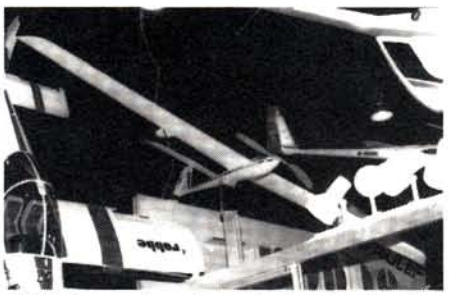
Another joint effort of Hirobo and Futaba. Electric Chipmunk should give the E-enthusiast a good aerobatic performer.

• United Model Distributors*: UMD imports the Italian line, Aviomodelli, which includes both power and sailplane models. Its latest addition is a scale model of the Caproni Calif A.14 high-performance sailplane. The model spans 162.2 inches, has an area of 1,054 square inches, a flying weight of 6 to 7 pounds, and uses 6 to 8 channels.

The wing and stabilizer are both pre-sheeted foam. The fuselage is white gel-coated epoxy fiberglass with a clear tinted canopy. A very extensive hardware pack is enclosed, and I think the kit also includes the airbrakes. The airfoil profile changes from a Ritz 2-30-12 to a NACA 4412. This model will excite all scale sailplane enthusiasts.

• Top Flite Models, Inc.*: Top Flite's newest product is a spin-off from its very popular Wristocrat HLG. The Phasoar/035 is a small electric sailplane designed around the Astro Cobalt 035 flight system. The model has a span of 57 inches, a wing area of 340 square inches and a flying weight of only 26.5 ounces. As I've said in previous columns, this size of electric model will be very popular in the near future. The Phasoar has one rather unusual feature; the batteries are carried in a detachable belly pod. This makes it very easy to change or charge packs, without having to remove the wing to get at the batteries. As with Top Flite's other sailplane models, the Phasoar was designed by Scott Christensen.

• Dynaflite*: With its ARF electric-powered Piece O' Cake (POC), Dynaflite is really going after the convert from R/C cars. The POC uses a pre-built, covered Wanderer wing (72-inch span) mated to its vacuum-formed ABS fuselage that has a plywood inner structure. The tail surfaces are built-up balsa and they're pre-covered. The POC was specifically designed to accept the motor, 6-cell battery pack and speed controllers that are now used in R/C cars. This should make the transition from cars to airplanes very easy and bring new fliers into the ranks.



Robbe's new Arcus looks fast, even when it's sitting still. High-performance, two-meter electric should be very popular with contest fliers.

• Robbe Model Sport*: Robbe had its new Arcus 2-meter electric sailplane on display. This is a very sleek high-performance model that can be built in a variety of ways. The wing can be built with polyhedral, or flat with ailerons for more experienced fliers. It can also be built as a geared 7-cell model, or as a direct-drive 10-cell model. Each flight system comes complete with motor, folding prop, coupler, battery, on/off switch and all necessary hook-ups.

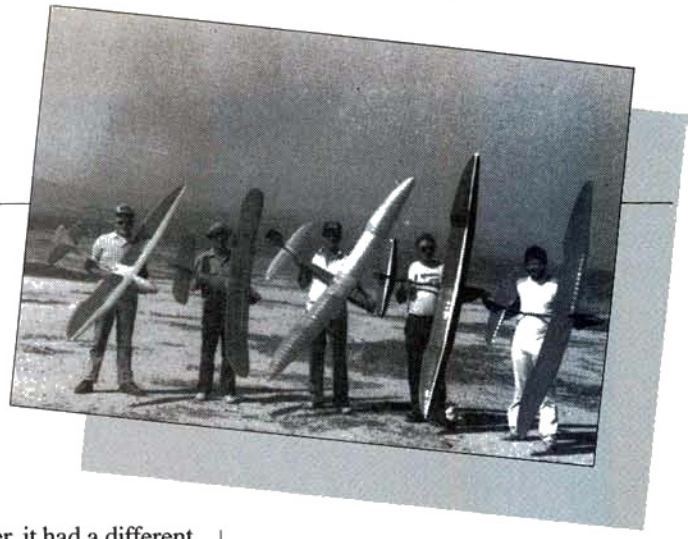
The pre-sheeted foam wing changes from the Eppler 178 to the E180, and this should make the Arcus a very fast model. With only 511.5 square inches, the 7-cell version would have a wing loading of 16 ounces per square foot. Although the Arcus has a Plura molded fuselage and pre-sheeted foam wings (almost making it a pre-built model), I think the novice should leave it to experienced, contest-oriented modelers.

• Futaba Corporation of America*: Futaba really had the big-news item at Toledo as far as electrics were concerned. Its new, un-named, Electric Aircraft Radio received lots of attention. Futaba showed a mock-up prototype that had a Conquest transmitter (not necessarily the transmitter that will come with the system), two S-148 servos (the actual system will have two S-133s), and its special integrated receiver, MOSFET speed control and BEC voltage regulator.

This is the radio that the sport electric enthusiast has been waiting for! With the BEC voltage regulator, you'll no longer have to carry a radio airborne battery pack; everything works off of the electric flight-system's battery pack. Although the speed controller only has three MOSFETs, it should be able to handle most sport motors designed for 6- or 7-cell operation. Testing is still being done, and as information becomes available, I'll pass it on.

Scott Christensen holds his new Phasoar design, soon to be kitted by Top Flite. The small hand-launch-size electric gets its motive power from an Astro 035 Cobalt.

Futaba also showed two new electric ARFs from Hirobo. You may recognize that name, as Hirobo has made some of

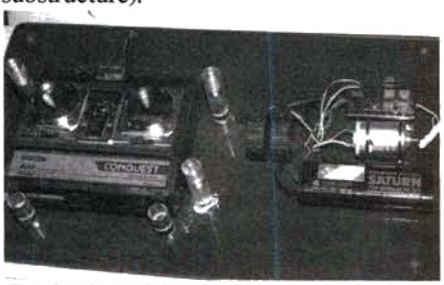


Old-Time Gliders at the SAM 26 meet. **Left to Right:** *Bob Sliff (Thermic 100), "Doc" Paterson (Raydic), Ken Meyers (Thermic 100; stick fuselage), Ross Thomas (Thermic 100), John Lupperger (Thermic 100).*

the finest R/C helicopters. The Professor is a high-wing rudder/elevator trainer designed for beginners. It uses a 540SH motor with a 3-1 gear-reduction unit, and it's designed for 6-cell operation. I've never been too thrilled with 6-cell operation, as any model that will "fly" on six cells will *really* perform on seven cells. However, the Professor may change my thinking about this. With Futaba's new radio, the claimed flying weight is only 32 ounces. With a span of 48.8 inches and a wing area of 446.5 square inches, the Professor's wing loading is a light 10.3 ounces per square foot. One reason for its lightness is the construction; the fuselage

Dynaflite's new Piece O' Cake ARF is designed around the popular car motors, batteries, and speed controllers. They are hoping to bring many new fliers into electric flight with this concept.

is made of molded plastic over a balsa substructure, and the wing and tail are what we know as "EZ" ARF-style construction (foam laminate over a balsa substructure).

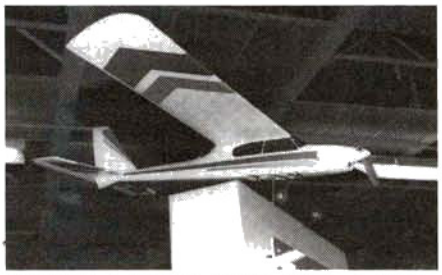


Futaba showed this prototype mock-up of their future Electric Aircraft Radio. System will be released with two S-133 servos. Compact receiver unit also includes MOSFET speed control, BEC and voltage regulator.

The other new model was a Chipmunk, which Futaba said they received only one day before the show, so they had very little information on it. From what I could see, the construction was similar to that of the Professor. However, it had a different gear drive and a modular motor, which makes me believe it was intended for 7-cell operation. More information, as it becomes available, and more on Toledo in the next issue.

Another New Class

Many of you will say, "Why in the world do we need another class of sailplane?" Well, as the old saying goes, "Different strokes, for different folks." Besides, this new class isn't likely to interfere with the classes that we presently fly. As a matter of fact, this new class is being promoted



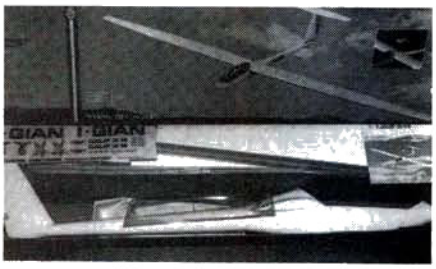
Professor 3-channel electric trainer is manufactured by Hirobo for distribution by Futaba USA. Light model should fly well on only six cells.

by the old-time free-flighters, who primarily fly power models.

In March, I attended the SAM 26 Club's Old-Timer Event at Taft, CA. For the first time, the schedule of events listed a new class: Old-Time Gliders. The class requires that a model should have been designed before December 1946. As with all other old-timer rules, the model planform, airfoil and general construction must be the same as the original design. Scaling up or down is permitted, and modifications for radio control are allowed. They also allow scale models of real sailplanes designed before the cut-off date, but they limit the span of this class to 120 inches.

The task is to get as close as possible to a flight time of exactly 20 minutes, with a maximum of three flights. The flight time can be achieved in one or two flights, but no more than three. There are no spot landings (who'd want to "dork" a beautiful old-timer design?), and fly-offs are at the CD's discretion. Overall, it's a very relaxed, fun-fly type of event.

At the SAM 26 gathering, there were six entries in Old-Time Glider. Three of the models had been designed after the cut-off date, but they were allowed to fly anyway. (Remember, this was supposed to be for fun.) A winch and a high-start were available for launching. Four different designs were present, including: three Thermic 100s, one Thermic 100 with a stick fuselage, one 1952 Zaic Raydic, and a Sinbad. Only the Thermic 100s with the pod-and-boom fuselages



United Model Distributors is now importing the Caproni Calif A.14, a scale sailplane from Aviomodelli of Italy. This is a large, 162.2-inch-span model that should really excite the scale enthusiast.

were legal, but these seemed to be the best flying models present. Everyone enjoyed watching the old-time gliders fly.

If this is well-received, we may have an event that can be flown without the pressures that are normally associated with contest flying. I'll try to attend as many SAM events as I can, and I'll let you know how it comes along. By the way, if you're thinking about your Level-V LSF thermal tasks, I don't think you could

(Continued on page 108)

KALT BARON 30 MX

(Continued from page 59)

ahead of the fuel tank. Due to the higher current drain, I switched to an SR* 1,200mAh flat battery pack. All this radio equipment just barely fit into the nose of the Baron, and I had to eliminate the simulated instrument panel from the cabin structure.

Exactly the right number of ball links and threaded pushrods is provided. A couple of the longer pushrods must be cut into two pieces (but the instructions don't tell you this) so that intermediate runs can be made from a servo to a bellcrank. The servo and bellcrank connections are made with Z-bends in the wire. I think that all pushrod connections on a helicopter should have ball links. Besides, using Z-bends leaves no room for error; if you make a rod the wrong length, you can throw it away! I only made the Z-bends to confirm that it *can* be done according to the instructions. The left/right cyclic pushrod from the servo to the bellcrank required a dog-leg to clear the nut that holds the collective-pitch control arm. I followed the instruction booklet for all the control throws except the main-blade pitch, which I set according to the supplementary set-up instructions.

TRIMMING AND FLYING: With both the gyro and the 1,200mAh battery up front, the Baron was slightly nose-heavy. That's good, because the supplementary instructions recommend this for aerobatics, but there are no ill effects on hovering or forward flight. At the field, I was able to hover the machine right after finding a good needle-valve setting. Only the tail-rotor pitch required adjustment for a stable hover, and one main rotor blade had to be raised a little for tracking.

On a fairly breezy day, I hovered for two full tanks before Rich Uravitch declared that he had enough pictures. To make the machine a little more stable initially, I dialed-in (at the transmitter) some extra collective pitch. This slowed down the main-rotor rpm for a softer response to throttle/collective changes in the hover. That's one of the benefits of using a helicopter radio.

For the third tankful, I backed off the extra collective and flew some high, wide circuits around the field to get the feel of the machine. Forward flight felt really locked-in. The controls weren't too sensitive, and there was no tendency to suddenly pitch up when forward stick was released. The Baron 30 can make a pretty brisk top speed for a small helicopter, and the Webra .28 has plenty of power. A few quick ascents and descents showed that I was still running slightly too much pitch in the main blades, so I planned to adjust the collective linkage for the next flying session.

The next time out, I did some aerobatics, and the Baron 30 seemed to take it all in its stride. Rolls were quite axial, with no altitude loss when done with the high-idle turned on. Loops looked best when performed rather wide open, since the small machine tends to lose its inertia on the way up. Pirouettes and stall turns showed that the tail rotor had good control power, especially with the gyro turned down low. By the way, I had the JR gyro plugged into a proportional channel so that I could dial-in any amount of sensitivity according to circumstance. As for autorotations, I think that the machine tends to float a little on the way down. Since my radio doesn't have a separate pitch curve on throttle hold, I don't have as much negative collective as is needed for really steep descents. That's OK, as long as I restrict my autos to fairly calm days.

I have no plans to try inverted flight, or to wind up the rotor-head rpm to the limit. For my use, the little Baron will perform admirably, and it's one of the most stable machines in its size class. It's a good choice for a novice or any advanced helicopter pilot. Try it!

**Here are the addresses of the companies mentioned in this article:*

Hobby Dynamics, 3132 S. Highland Dr., Las Vegas, NV 89109.

Webra; distributed by United Model Products, 301 Holbrook Dr., Wheeling, IL 60090.

O.S.; distributed by Great Planes Model Distributor, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.

Enya Model Engines/Altech, P.O. Box 286, Fords, NJ 08863.

Loctite Corp., 18731 Cranwood Pk., Cleveland, OH 44128.

Hobbypoxy Division, Pettit Paint Co., Inc., 36 Pine St., Rockaway, NJ 07866.

SR Batteries, Inc., P.O. Box 287, Bellport, NY 11713.

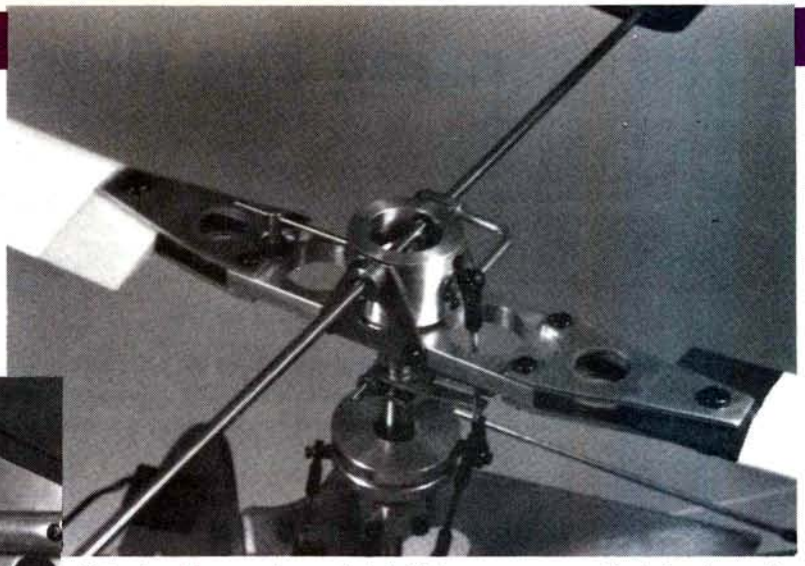
SPORT 500

by RICH URAVITCH

CROSS-OVER MACHINE FOR FIXED-WING FLIERS.

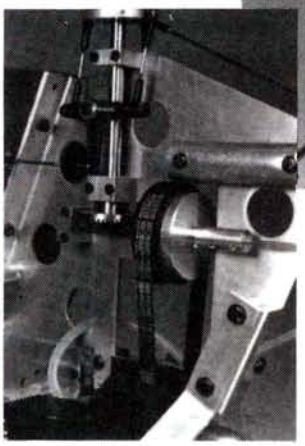
THE AD SAID, "Here's the *very best* R/C helicopter for the modeler who has never built or flown an R/C helicopter!" Now that, my fixed-wing friends, is a pretty bold statement, and one which seemed to invite investigation. Not wanting to be left out of the action in this issue, I felt I was as good a candidate as anyone to

Airborne or static, the Sport 500 is an attractive machine. Varied-tone paint job creates a somewhat different look from solid-color finishes.



Rotor head is rugged; swashplate linkages are uncomplicated and easy to adjust.

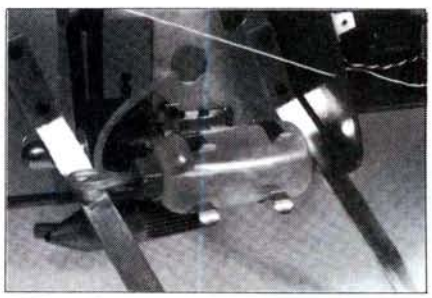
try my hand at this helicoptering. After all, like many of you, I flew only fixed-wing airplanes and was reasonably good at it (no, that's not open for debate!), but I'd seen some really good chopper fliers do amazing things with their "machines." In addition to all that, reading the helicopter material submitted by our contributors whet my appetite to try one myself.



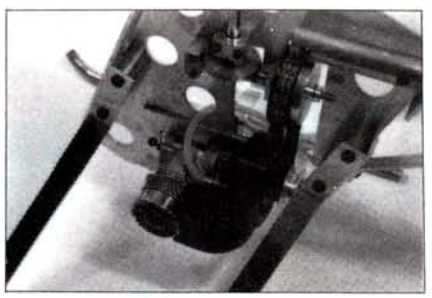
Toothed belt provides drive for tail and main rotors. Hefty metal gears employed.

My approach to this article was easy. I talked to a lot of experienced fliers, listened to their views, obtained the kit, and charged headlong into the review with no previous experience to rely on—probably just the way *you* would! If *you* adopt this approach, you'll find that most of the "experienced fliers" will probably tell you that you'd be much better off with a "machine" with "collective pitch." My position was and, to some degree still is: If you're a rank beginner and don't know the differences, you certainly won't be able to appreciate them. Kind of like telling a student pilot that he'd be better off learning to fly his first cross-country in an autopilot-equipped Baron rather than his VFR-paneled C-152. He knows you're probably right, because he's heard it before and probably read about it, but he hasn't *done* it and he therefore can't relate to it directly. This review will present my observations and experiences so far. In the future, when I've had an opportunity to try a collective-pitch machine, I'll reconsider my views and give you a comparison of the two types.

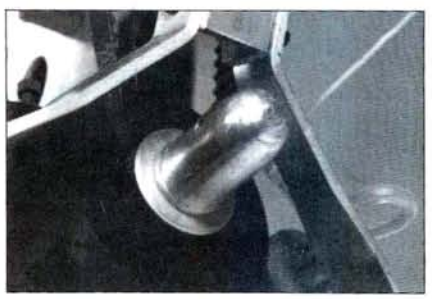
THE KIT: This is manufactured in England by Model Flight Accessories* (MFA) and distributed exclusively in the U.S. by Hobby Lobby International*. Everything is packaged in a compact box that survived the shipping folk's wrath unscathed. I'm not really sure *what* I was expecting, but my first impression was of a giant Erector set. The only balsa in the box was the trailing-edge portions of the pre-shaped, flat-bottomed main rotor blades. All the hardware items are contained in four numbered bags, while most of the other items are bagged in sub-assembly package order, which simplifies things considerably for the first-timer. The "paperwork" includes a 16-page instruction manual that takes you from opening the box right through set-up and flying. Eight of these pages contain 51 photos that are keyed to the text. It's a good thing they're there, too, 'cause I'm sure I couldn't have completed this project without them. The rest of the kit consists of a clear, vacuum-formed canopy or body, main and tail rotor blades and a sheet of water-transfer decals.



Right side shows fuel tank retained by two spring clips. Typical of heli practice: visible fuel supply.



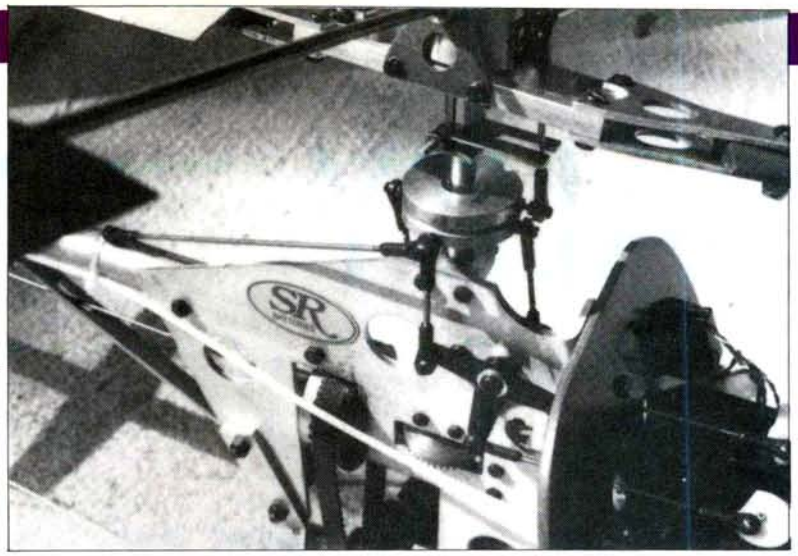
Early stages of assembly. O.S. 46SF installed, cooling shroud fitted.

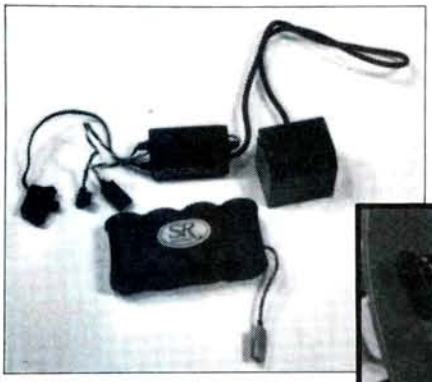


Non-supplied aluminum spinner, installed to eliminate need for starting belt, replaces pulley in photo to left.

CONSTRUCTION: Since this was my first helicopter kit, I read and re-read all the written instructions and referred to the photos. Doing this, you'll become familiar with some of the terminology. You'll start to understand things like swashplate, blade holders, teeter damper wire and tail-pitch yokes, as well as some terms we colonials have already accepted, like U/C (undercarriage or undercart) and ball race. Oh, what a learning experience!

(Continued on page 72)



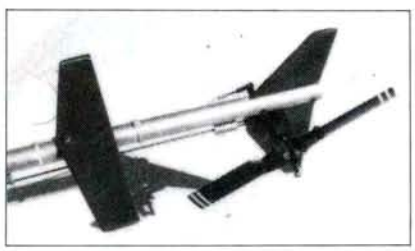


Above: *Right side view showing straight linkage from bellcranks to swashplate, all with ball links.*
Left: *Radio installation (Avionics Suite). Gyro rate unit "Velcro'd" on near side.*
Far Left: *Futaba gyro and SR 1,200mAh battery used with standard 4-channel aircraft radio.*

I found it much easier to separate the manual into three pieces: text, photos and parts-identifier sheet. It saves a lot of jumping-around time. Assembly progressed very well, but I can't stress enough the importance of paying attention to both the photos and the text. Some parts look similar, but on close inspection, are different enough to prevent proper assembly. A typical example is the main-rotor mast-bearing blocks (parts No. H4 and No. H5). They are similarly sized and drilled, but one contains a ball bearing, and the other, an Oilite bushing. It's a good idea to draw a line on each sheet of the instructions to use as a metric scale when selecting the hardware called for in a step. After discovering you've selected the wrong grip length, you won't enjoy removing small screws that have been "Loctited" into place! While mentioning that, the length of the screw refers to the threaded area, and *doesn't* include the head!

I used an O.S.* .46SF for power, and the installation of the cooling fan and shroud presented no real problems. The key here is to get the shroud to fit as closely as possible to the cylinder head, to best utilize the cooling air generated by the fan. Among the other minor glitches I encountered was the requirement to shorten the tail-rotor drive rod about one-eighth of an inch and extend the tail-rotor control cable about half an inch. Moving along to more familiar territory, I found that assembly of the radio/electronics area was a piece of cake. This consists of five plywood parts (unfortunately not die-cut) that I zapped together in true model-builder fashion. At this point, I cut out and finished the remaining ply parts, like the horizontal and vertical fins and the pitch gauge. After sanding the parts and applying two coats of Loctite* finishing resin, I sprayed on a couple of coats of Rustoleum enamel which, so far, seems to be holding up well. Feeling more comfortable in this environment, I "MonoKoted"* the tail-rotor blades, and applied the kit-supplied main-rotor covering (a contact-paper-type material) according to the instructions. This included the application of different-color striping for each blade tip to make blade tracking (another new term) easier.

I was now closing in on final assembly, which included trimming and painting the clear body. I did this with spray paint formulated for the Lexan-body R/C cars that are so popular. I sprayed it from the inside, which makes the color deeper and much more scratch-resistant than applying it from the outside. I didn't particularly care for the lack of clarity in the molding, but I assume the selection of material was dictated by damage tolerance rather than scale esthetics.



Tail rotor, horizontal and vertical stabilizers. Blades are MonoKoted.

As a final step, I balanced the main rotor blade/rotor head assembly. I did this by placing an awl in my bench vise (point up) and placing the rotor assembly on

Worst position for beginner to be in—nose in! Helicopter, rather than author, seemed to be in control!!

Dobyns' Rotopod helped in learning stages. Saved considerable expensive damage.

the point. One extra stripe on the light blade took care of balance.

EQUIPMENT INSTALLATION: I used my tried-and-true, 4-channel Futaba* Conquest radio in the Sport

(Continued on page 99)

Welcome to the world of R/C helicopters. While originally very limited, the appeal of the heli has broadened to now include something for nearly everyone. There are even electric-powered machines on the horizon. To better acquaint our readers with the wide array of helicopter equipment available, we have prepared this Buyer's Guide, which we hope will allow you to "zero in" on your interest.

R/C HELICOPTER BUYER'S GUIDE

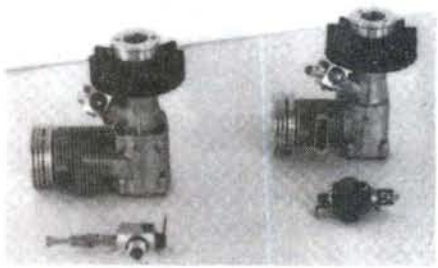
MINIATURE AIRCRAFT, USA

X-CELL HELICOPTER

The X-Cell Fifty and Sixty Series helicopters are manufactured in the USA by Miniature Aircraft. They are the most well-equipped helicopter kits on the market, and they're backed by a world-wide service and inventory organization. The X-Cell features a 49-inch rotor span, its ready-to-fly weight is 7.3 pounds, and it requires a 50-size helicopter engine. The X-Cell 60 has a 57.2-inch rotor span, its weight is 8.3 pounds, and it requires a .60-size helicopter engine. Both are winners of top world competitions.

BELL 222 KIT

Miniature Aircraft offers a Bell 222 conversion kit for Heim Helicopters (shown with optional Airwolf mods). The kit comes complete with autorotation and retractable landing gear. Jet Ranger, Lockheed 286, and Agusta 109 kits are also available.



WEBRA CUSTOM ENGINE

Webra now manufactures custom helicopter engines that are available in ring

or ABC design with X-Cell- or Schluter-style fan assemblies. Each of these engines comes with Miniature Aircraft's exclusive Pro-Mix carburetor and extensive parts back-up to keep your copter in the air. The custom carburetors are also available for most other applications.

EPOXY/KEVLAR FUSELAGE

The X-Cell Quick Silver fuselage with its ultralight, durable Kevlar construction, is designed specifically for aerobatics. The Quick Silver allows complete access for quick repairs at the field.

LONG RANGER III

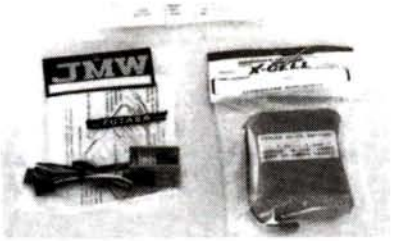
Miniature Aircraft has added the Bell Long Ranger to its line of replacement fuselages. This fuselage has a very low overall weight and complete service access, and it's 100 percent scale.

JMW GYROSENSORS

The JMW Gyrosensors (imported from Japan exclusively by Miniature Aircraft) are World Championship-winning gyro systems. These JMW units are available in three different formats, from beginner to expert.

JMW RANGE SELECTOR

These JMW Range Selectors, with full airborne range selection capacity, are used to update the JMW Intermediate Series gyros to Stage III efficiency.



JMW VOLTAGE REGULATOR & BATTERY

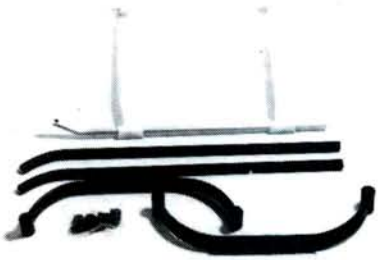
This JMW regulator/battery combination supplies a consistent 5.2V to the radio and 7.2V to the gyro system. Flight tests have proven that, even under the stress of high-performance flying, this system has the capacity to handle all radio and gyro functions with power to spare. It's for use with JMW Intermediate and Expert gyro systems.

MAGNA-PIPE

The Magna-Pipe Tuned Exhaust System from Miniature Aircraft is a very quiet, highly efficient tuned exhaust with headers to fit all helicopters. It comes with all the necessary hardware, including silicone and special clamps for installation.

MAGNA-MUFFLER

The Magna-Muffler has the same baffle and high-quality construction as the Magna-Pipe systems, but with the convenience and low cost of a one-piece design. It's ideal for novice or scale applications.



TUF-STRUT LANDING GEAR

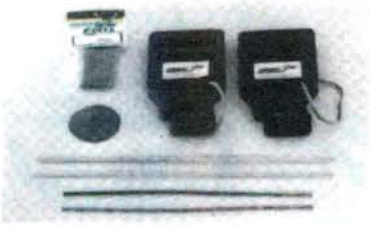
Miniature Aircraft's Tuf-Strut Landing Gear is the most popular and most versatile landing gear in the world, with over 20,000 sets sold! This landing gear is durable enough for those almost-made-it autorotations or those harder-than-average landings. The scale-like appearance make it a must. It's available in black or white, and there are two sizes to fit most applications. The Tuf-Strut I suits all large .60-size craft; the Tuf-Strut II is designed for use with .50-size and smaller copters.

ROTORSPORT BLADES

These Rotorsport high-performance rotor blades feature ultrastrong mounts that have been tested to over 4,000 pounds. This strength is made possible by the latest technology in hardwood lamination. Available in symmetrical and the popular Techna I Reflex styles, they're acclaimed worldwide as the best-quality wood blades!

ROTORSPORT BLADE COVERING

To accompany your set of Rotorsport Blades, Miniature Aircraft offers Rotorsport Hi-Tack blade covering. This special covering won't swell at high speeds, and it's available in red, black (satin), yellow, gray and white.



BLADE ACCESSORIES

To ensure the best possible performance from your machine, Miniature Aircraft has a line of accessories for your rotor blades: blade-weight material for balancing the two blades, blade guards to protect your blades during transportation or storage and strip lead and balsa caps to correct their CG.

THE ALERT

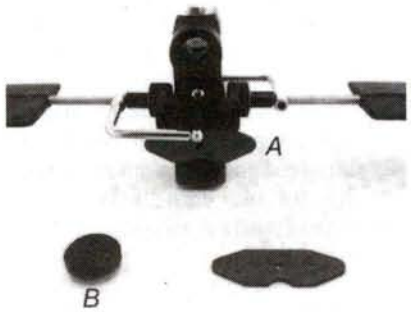
The Alert is an early visual-detection device for low battery levels. This light unit can be mounted in a canopy window to be seen at a distance even during flight.

X-CELL METRIC SET

Miniature Aircraft now offers a metric service set for your X-Cell helicopter. This set includes many spares of all the popular Allen bolts, setscrews and nuts.

CONTROL HARDWARE

For the times when you're grounded because of the failure of a small, inexpensive linkage part, Miniature Aircraft has introduced a line of control hardware that includes threaded steel balls in a variety of configurations for all applications. Strong clevises are specially reinforced to provide straight, secure torque transfer. All pieces of hardware are metric threaded.



FLY-BAR LOCK

The X-Cell Fly-Bar Lock will hold your fly bar steady during set-up, yet still allow 100 percent operation of all controls. A head button is also available to provide added comfort when slowing down the rotor head manually.

CLOTHING

Miniature Aircraft offers a line of apparel for those of you who want to tell the rest of the world that you're proud to fly an X-Cell. A silver satin jacket, a silver, yellow, blue or white T-shirt and a baseball-style hat are available—all with the four-color X-Cell logo. You may also buy a sew-on logo patch.

PITCH GAUGE

Check the pitch of your blades with Miniature Aircraft's precision Pitch Gauge. It's accurate from positive 16 degrees to negative 16 degrees.

METRIC TOOLS

A complete line of precision metric tools, featuring fully guaranteed, hardened magnetic tips and swivel handles, is available from Miniature Aircraft. All popular sizes are available individually, in groups, or in custom tool cases containing popular combinations—a pitch gauge, ball-link tools, fly-bar lock and tail-rotor balancer.

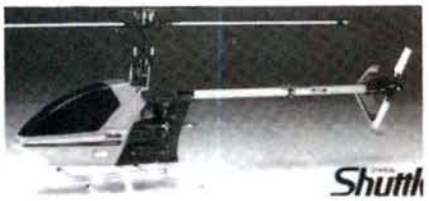
TAIL-ROTOR DRIVE SYSTEM

This new drive system for the X-Cell eliminates any "wind-up" associated with wire- or belt-type systems. During over one year of field testing, this system produced superior tail control and gyro effectiveness.

MAIN-SHAFT THRUST BEARING

This thrust-bearing support kit for the X-Cell transfers the load on the main shaft to a thrust bearing. This bearing is easy to install, and gives remarkable results for both acceleration and autorotations.

GORHAM MODEL PRODUCTS



HIROBO SHUTTLE AND SHUTTLE XX

The Hirobo Shuttle, factory-assembled collective-pitch helicopter has now been redesigned and improved and its flight-performance range expanded. The Shuttle is an excellent copter on which to learn basic flying, right up to expert aerobatics. The Shuttle XX has 18 extra ball bearings for extra smoothness and contest-winning performance. Fully painted Jet Ranger, Hughes 500E and Ecureuil fuselages are available. The Shuttle and Shuttle XX have a 41-inch rotor span, are 39 inches long, and they require a .25 to .32 engine and a 4- or 5-channel radio.

GIANT-SCALE HELICOPTERS

Completely revised and improved, Hirobo's 1988 Giant-Scale Helicopters are now available. These almost-perfect scale helicopters utilize a new 25cc engine and twin 71-inch main rotor blades. Interior and exterior details are spectacular. If you want to own the largest and the finest in the world, these new Hirobo Giant-Scale Helicopters are for you. They have 71-inch rotor spans and require 25cc engines and a 4- or 5-channel radio system.

CHINOOK

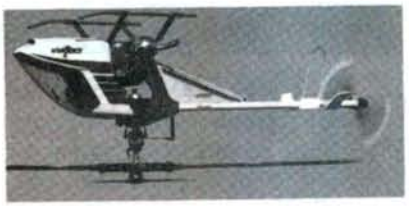
This is a first in R/C helicopters—a twin-rotor Boeing Vertol "Chinook"! The Chinook will be available through GMP this summer, and it's sure to be a hot seller! The Chinook has twin three-bladed rotor systems and uses the now-proven toothed belt-drive.

HIROBO Z-STARTER

The Z-Starter is a light, compact, self-contained and easily maneuvered unit. This starter is fitted with 5-1 steel gear reduction and a one-way clutch on the output shaft, which prevents belt snatches. This may be used with belt starters or nose-cone starters.

CRICKET

Stable, sturdy and responsive, the Cricket is the most popular .25- to .32-powered R/C helicopter made in the U.S. today. It's ideal for the beginner, because of its easy building set-up and its flying characteristics. The Cricket is portable and well-known for its low-cost upkeep and quick field repairs. Spare parts are available worldwide, and there are more than 1,000 U.S. dealers. The Cricket has a 34-inch rotor span, is 32 inches long and requires a .25 to .32 helicopter engine and a 4-channel radio.



COBRA

The Cobra is a fully aerobatic R/C helicopter specifically designed for all fliers, whether beginners or experts. Hovering and forward-flight stability is unsurpassed, while aerobatic performance is breathtaking. The Cobra can perform all AMA and FAI aerobatic maneuvers. The King Cobra, a .60-size contest version of the Cobra, is also available. The Cobra has a 50-inch rotor span, is 44 inches long, and it requires a .40- to .60-size helicopter engine and a 4- or 5-channel radio system.

COBRA JET RANGER

The contest-winning qualities of the Cobra are further improved by the addition of GMP's Jet Ranger fuselage. The GMP Ranger placed first and second in the 1987 World Championships USA team trials, and first and second in the '85, '86 and '87 Nationals. It also placed fifth in the 1987 World Championships in Switzerland. The Jet Ranger has a 50-inch rotor span, is 44 inches long, requires a 4- or 5-channel radio and a .40- to .50-size helicopter engine.

TRAINING GEAR

Extend your landing gear to help prevent "tip-overs" on the first few hovers. Light and easy to fit, they're a great help to beginners.

HELICOPTER VIDEO

Take a look at the experts doing their stuff and learn to hover with one great video. Sit back and relax as you watch this 23-minute videotape of beginners and experts flying GMP's helicopters. Professionally filmed and narrated, it brings to life the flying maneuvers a helicopter enthusiast wants to see. The video also includes a section that gives step-by-step instruction in how to hover.

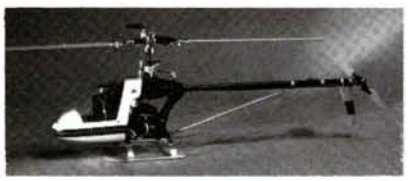
LEGEND

The Legend is the latest .50- to .60-powered sports/contest helicopter in the GMP collection. The kit's special features are its lightness (mainly metal construction) and its versatility. The Legend's new rotor head is simple: all metal, yet very light. The tail drive uses a toothed belt to the tail-rotor unit, which is made of quality aluminum and steel. Many annoying features found on other copters have either been improved upon or eliminated here. The Legend has a 57-inch rotor span, is 50 inches long, requires a .50 to .61 engine and a 4- or 5-channel radio.

CIRCUS HOBBIES

CYCLONE

This new-generation helicopter is as easy to build as it is to fly. Its super-strong composite main frame, belt-driven tail rotor, Bell Hiller mixer, factory-assembled collective-pitch rotor head, pre-finished main rotor blades, tail rotor blades, ABS body, clear canopy, motor mount, fuel tank and all necessary hardware can be built in four to six hours. This is a great choice for both the novice and the expert. The Cyclone has a 55-inch rotor span, is 50 inches long, weighs 8.7 to 9.2 pounds, and requires a 5- to 7-channel radio and a .49 to .50 helicopter engine.



BARON 28

The Baron 28 is a great economical choice for the novice. With features like collective pitch, the Baron 28 is a stable, precise flying machine that's perfect to learn on. The easy-to-build kit includes: rotor head, main rotor blades, tail rotor blades, ABS body, clear canopy, aluminum motor mount, cooling shroud, fuel tank, all necessary hardware and easy-to-follow instructions. The Baron 28 has a rotor span of 43 inches, a length of 42 inches, a ready-to-fly weight of 4.6 to 5 pounds, and it requires a 5- to 7-channel radio and a .25 to .28 helicopter engine.

BARON 50A

The Baron 50A is an extremely stable, predictable helicopter that's perfect for the novice and competitive flier. Features include: autorotation, collective pitch, and the Kalt K-1SB precision rotor head (other heads available as options). Also included are the ABS body with clear canopy, pre-finished main rotor blades, tail rotor blades, aluminum motor mount, fuel tank and clear instructions. The Baron 50A has a 57-inch rotor span, is 51 inches long, weighs 8.2 to 9.4 pounds, and requires a .50 to .60 engine and a 5- to 7-channel radio.

BARON 30 MX

This high-performance addition to the Baron line offers the great features usually found only on larger, more expensive models. With standard equipment like larger-diameter main rotor blades, collective pitch, metal clutch, Bell-Hiller mixing, autorotation and metal tail boom, this helicopter is perfect for the novice or advanced flier. This easy-to-build kit includes: assembled rotor head, main rotor blades, tail rotor blades, ABS body, clear canopy, aluminum motor mount, cooling shroud, fuel tank, hardware and instructions. The Baron 30 MX has a main rotor diameter of 48.5 inches, is 42 inches long, weighs 4.6 to 5.5 pounds and requires a 5- to 7-channel radio and a .25 to .30 engine.

SCALE FUSELAGES

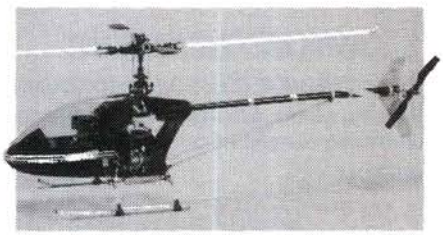
Add that great look of realism to your Kalt Helicopter with one of these fine scale fuselage kits. Each fuselage is molded of extremely light, yet highly durable, fiberglass, and is ready for final assembly and finishing. The kits include mounting hardware, bulkheads, fins and stabilizers, clear canopy, and easy-to-follow instructions, as well as detailed plans.

Bell 222: Fits the Baron 50, Baron 60

and Cyclone. Retracts are also available separately.

Bell Jet Ranger: Fits the Baron 50, Baron 60 and Cyclone. "Big scale" Jet Ranger also available.

Bell Long Ranger: Fits the Baron 28 and Baron 30 MX. It's also available for the Baron 50, Baron 60 and Cyclone.



BARON 60EX

This is the great Baron 60EX with special features to produce maximum stability, high rotor speeds and reduced vibration. High-grade aerobatics and rolling maneuvers can be easily achieved with this super performer. The easy-to-build kit includes all the equipment of the Baron 60, as well as a factory-assembled, World Championship Blackhead 1 rotor head and other high-performance modifications. The Baron 60EX has a main rotor span of 55 to 57 inches, a 51-inch fuselage, weighs 10.4 pounds, and requires a .60 helicopter engine and a 5- to 7-channel radio.

GALAXY HELICOPTER SYSTEM

The latest technology in microcomputers and central processing units has come of age with this easy-to-use, computerized, radio-control system. With the Galaxy Computer 8 helicopter system, the modeler can store trim settings for up to seven different models,

or the same model can be set up to achieve various flight characteristics. The Galaxy 8 can transmit via PCM or PPM, and it has the lowest battery drain of any PCM available today. Features include: liquid crystal display (LCD), 5-year lithium battery, fail-safe systems for battery and signal loss, ATV end-point adjustments for all channels, servo-reversing for all channels, dual rate and exponential controls, throttle hold-switch, throttle curve, inverted flight system, full Ni-Cd batteries and charger, four JRS-4001 servos, switch harness, servo-extension cable, direct servo controller and mounting hardware.

JR PCM SINGLE & DUAL-STICK HELI SYSTEMS

These 9-channel PCM systems offer the helicopter enthusiast uncompromising control in both the dual-stick and single-stick formats. The PCM 9s offer the ABC & W dual-conversion receiver that meets 1991 standards. Other features include plug-in transmitter RF module system, ratcheted, electrical double-trims, servo-reversing on all nine channels, end-point adjustments, dual rate and exponential controls, anti-torque tail-rotor mixing, four separate collective-pitch control systems, two high-idle and throttle-hold

systems and an inverted flight system. These systems come complete with four JRS-4001 servos, rechargeable transmitter and receiver batteries with charger, servo-extension cable, switch harness, direct servo controller and mounting hardware.

APOLLO 7

This system has seven channels with servo-reversing on five channels. The Apollo 7 features an anti-torque tail-rotor compensation system, pitch-curve adjustment, a plug-in RF module and adjustable-length sticks. The Apollo 7 helicopter system comes complete with rechargeable transmitter and receiver batteries and charger, four JRS-501 servos, a switch harness and mounting hardware.

CIRCUS 6

This is a 6-channel, digital proportional system with JR quality and reliability.

The Circus 6 AM Helicopter system features a 6-channel receiver with servo-reversing on four channels. This system also includes anti-torque tail-rotor mix and throttle/collective mixing. This system, available in mode 2 only, comes complete with rechargeable transmitter and receiver batteries and charger, switch harness, all mounting hardware and two JRS-505 and two JRS-506 servos.

CENTURY VII

The Century VII PCM helicopter radio system features the ABC & W receiver, 7-channel servo-reversing, ratcheted double electronic trims, plug-in transmitter and receiver module system, dual-rate and exponential controls, inverted flight system, anti-torque tail-rotor compensation system, hovering throttle system, high idle and throttle-hold system and adjustable pitch curve. The Century VII comes complete with four JRS-501 servos, rechargeable transmitter and receiver batteries with charger, servo-extension cable, switch harness, direct servo-control cord and mounting hardware.

BELT DRIVE

This after-market item was developed for fliers who demand higher performance from their Kalt Cyclones. Without modifications, this system easily replaces the main- and tail-belt pulleys. The main toothed-belt pulley is constructed of high-quality machined aluminum. The tail pulley is of hardened steel, and the toothed belt is made of fiber-reinforced rubber.

JR GYRO

Former World Champion, Mr. Taya, says this is the best gyro he's ever used. Technologically similar to the JR Pro Gyro, the Competition Gyro has additional ball bearings and a heavier main shaft for outstanding control performance.

E and G ENTERPRISES

JET RANGER FUSELAGE

E and G now manufactures light, impact-resistant Jet Ranger fuselages, designed to be installed on the Shuttle or Baron 28 helicopters. These affordable kits feature easy assembly, complete hardware pack, longer starting belt and removable balsa fins. The fuselage is of .030-thick transparent plastic material and is painted from the inside with a fuel-resistant polycarbonate paint. This protects the finish.

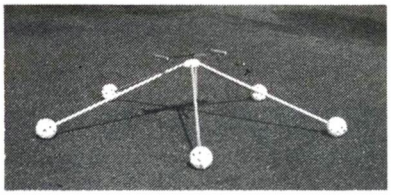
HUGHES 500 F

This Hughes 500 F follows the very successful Jet Ranger fuselage kit. The fuselage is made of .030-thick transparent plastic material that's painted from the inside to protect the finish.

DOBYNS ENTERPRISES

ROTOPOD

The many unique features of the Rotopod make it easier and safer for beginners to learn to fly their helicopters. The pentapod construction provides a lot of

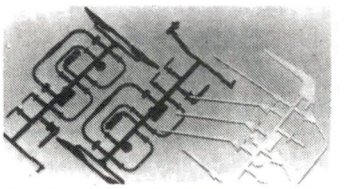


stability during takeoff and, for those hard landings, it has a cushioning effect to prevent damage to your helicopter and radio gear. The Rotopod is available in two sizes: for helicopters up to six pounds, and for those up to 11 pounds.

ROTORCRAFT

AUTOROTATION KIT

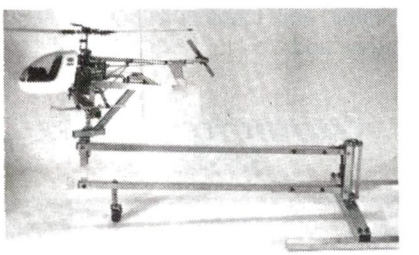
Rotorcraft now offers an Autorotation Kit for Heim helicopters that allows complete control of the tail rotor while autorotating.



SCALE ANTENNA KIT

A complete set of Vario Rotor Systems scale antennas is available for all types of helicopters from Rotorcraft.

WHITEMAN INDUSTRIES



FLYING STAND

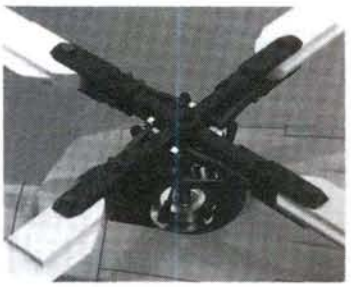
The unique design of the Whiteman Flying Stand will develop your flying skills without risk to your helicopter.

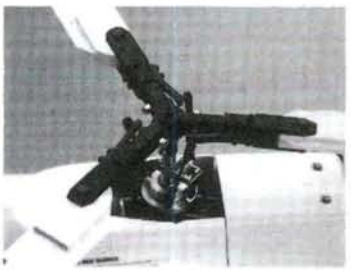
The stand will always keep your helicopter off the ground. This Flying Stand will allow you to fly forward, backward and sideways, and also to hover, pitch forward and backward, fly in a seven-foot-diameter circle and reach a height of four feet. Your helicopter lifts only its own weight and not the weight of the Flying Stand, which is activated by a gas strut.

ROBBE

BK 117

When the full-scale BK 117 appeared on the market, Dieter Schluter virtually fell in love with it. This copter combines a well-proven Championship design with a high-quality lightweight GRP scale body. The kit also includes the unique 45-degree gearbox necessary for the high-mounted tail rotor, and it's available in two- or three-bladed versions.





ROTOR HEADS

Schluter offers a number of helicopters with three- and four-bladed rotor heads. Available through Robbe Model Sport, these heads are now available separately and may be adapted to almost any copter on the market. Collective-pitch control is achieved by raising and lowering the swashplate, so the rotor blades are controlled directly (without flybar). Electronic or mechanical mixing capabilities are required for the operation.

45-DEGREE GEARBOX

Although originally designed for use in Schluter's BK 117, this gearbox can be used for any scale project that requires a high-mounted tail rotor.

PITCH GAUGE

This device is used to set the pitch on the main blades, tail-rotor blades and flybar paddles. It's extremely accurate and should be used on all R/C helicopters.

AVANTGUARDE

The Avantguarde is the only Heim pod-and-boom helicopter available, and it's designed to meet the requirements of the most demanding pilots. Whether it's for first attempts at autorotation or for aerobatic practice, this model won't disappoint you. The Avantguarde has a rotor span of 56.3 inches, is 53.2 inches long, weighs 9 pounds, 15 ounces and requires a .60-size helicopter engine.

MECHANICAL MIXING SET

This new control system is extremely precise and eliminates the need for a special transmitter with electronic mixing. The three servos for pitch, roll and

collective can be tilted, and they're connected with a pushrod system that moves the servos simultaneously as the collective-pitch servo is activated. The servos for pitch and roll control the swashplate with two pushrods each. This set can be used on all Schluter helicopters as well as on other makes, if you're flying a helicopter with a sliding swashplate or a multi-blade system. The kit has injection-molded plastic components for the tilt mechanism, pushrods, and ball connectors, two 90-degree levers, hardwood, and templates for the plywood components.

CHAMPION

The Champion was developed to meet the needs of advanced and competition-minded pilots. To date, it has far surpassed all expectations. In fact, most of the recent helicopter designs have in some way incorporated the Champion format. With its rugged metal construction, easily accessible components and straightforward design, this helicopter is excellent for beginners as well as experts. The Champion has a main rotor span of 55 inches, it weighs 9 pounds, 11 ounces and requires a .60-size helicopter engine.

ECUREUIL

This is a semi-scale version of the French Twin Star helicopter. Because of its high standard of prefabrication, this attractive scale model can be completed

easily. Its main advantages include the well-known Heim mechanics that are exploited to the fullest in the Ecureuil. The main rotor has a 56.3-inch diameter, the helicopter is 61 inches long and requires a .60-size helicopter engine.

HOBBY LOBBY

SPORT 500

The Sport 500 is a lightweight helicopter with a proven Hiller Teter rotor control system. Its lightness means that the Sport 500 is never marginal. It flies easily and lightly, not just barely on the edge. Its features include ball bearings (so it needs less maintenance), easy engine starting, an easy-to-adjust fixed-pitch rotor head and more. The Sport 500 has a rotor diameter of 42 inches, it weighs 7 pounds, and it requires a .40 to .45 engine and a 4-channel radio.

HUGHES FUSELAGE

Also available for the Hobby Lobby Sport 500 is a scale Hughes 500E fiberglass fuselage. In this conversion, the fiberglass tail boom is an integral part of the structure and the metal boom of the Sport 500 is no longer used.

CLOU

The Clou is a new, revolutionary, Heim design, especially for the beginner. The main frame consists of two injection fiberglass-reinforced plastic shells. To assemble the unit, all interior fittings, including gearbox blocks, ball races, shafts and more, are placed in one shell. The second shell is fitted on top, so enclosing the unit. The Clou has a rotor span of 51.2 inches, it's 45.7 inches long and it requires a .40 to .50-size engine.

MORLEY HELICOPTERS

HUGHES 300

This very realistic model is well established, both as a basic trainer and for exciting sport flying. For training, it has all the advantages of a "bubble-and-stick" format with easy access and maintenance. It's designed to take all the popular .40-size engines, but it will also fly very gently with a .28 helicopter engine. The engine is mounted upright and uses standard aircraft-type mufflers.

BELL 47

First licensed in 1946, with many still flying, the Bell 47 is one of the world's classic helicopters. At 1/9 scale, this semi-scale model is suitable for beginners who need to learn the basics of helicopter flight or for more experienced pilots who want an attractive model that's pleasant to fly. Floats, an auto-rotation unit and a tail-rotor control gyro may be fitted as options. The Bell 47 weighs in at 7.5 pounds and requires a .40-size engine.

AGUSTA 109

The Agusta 109 from Morley Helicopters is a 1/10-scale kit of the modern French executive helicopter. This almost-scale kit features Morley Mk 3 mechanics in a formed-alloy chassis that may be removed from the fiberglass body. It's complete with engine, transmission (including the main gearbox), servos and linkage, mast, swashplate and rotor head (all in one). A unique feature of the Agusta is its retractable undercarriage. This custom unit is similar to the real thing, in that the main undercarriage doors open and close when the wheels move (gear can also be fixed). The Agusta has a rotor span of 48 inches, it's 46 inches long, weighs 8 to 8.5 pounds and requires a .40- to .45-size engine.

MANUFACTURERS' ADDRESSES

Miniature Aircraft USA
2324 N. Orange Blossom Trail, Orlando, FL 32804.

Gorham Model Products
23961 Craftsman Rd., Calabasas, CA 91302.

Circus Hobbies
3132 S. Highland Dr., Las Vegas, NV 89109.

E and G Enterprises
24325 Val Verde Ct., Laguna Hills, CA 92653.

Dobyns Enterprises
Box 1716 Calavera Pl., Fullerton, CA 92633.

Rotorcraft
Box 7061 St. E., London, Ontario, Canada, N5Y 4J9.

Robbe Model Sport
180 Township Line Rd., Belle Mead, NJ 08502.

Hobby Lobby International
5614 Franklin Pike Cr., P.O. Box 285, Brentwood, TN 37027.

Morley Helicopters R/C Models
P.O. Box 6026, San Pedro, CA 90734.

ROTARY TRANSITION

(Continued from page 14)

to justify the extra expense. There are many superbly engineered helicopters in this class, and when set up properly, they'll fly with much less pilot effort than the other two classes. The disadvantage is, of course, cost; the larger engine, a medium-priced radio, a good gyro and all the other goodies will cost about $1,000.

The Radio System

More than once, I've heard a fixed-wing R/C pilot say, "I don't need all those switches; I've been flying a long time, and I've never ever used a dual-rate switch!" Well, the reason for the increasing popularity of helicopters isn't just better machines! Some electronic R/C systems are now built *exclusively* for R/C helicopters. By asking some questions and following directions, an average modeler can successfully set up a helicopter electrically instead of in the previous nightmarish mechanical/geometric way. There are essentially three categories of heli radios: the $250 to $350 range, the $350 to $500 range, and the over $500 range. The first and the last of these aren't a good idea for your first radio. The first doesn't offer enough features, while the last will confuse you. Middle-range radios will take you from hovering to as far as you want to go—and then some! Remember, you may get what you pay for, but rarely more, i.e., if you go for a lower-price radio, you'll eventually pay in some other way (mostly in time and labor setting it up). With good helicopter and radio instructions, the control set-up, even for a first-timer, should be readily accomplished in less than an evening.

For comparison, ask each radio manufacturer which features are included. Things to look for: throttle hold, high idle, pitch-curve set-up, tail-rotor compensation (left or right), dual-rate switch, and (if using a non-stick priority gyro) a switch for an extra channel. Also, since almost all modern helicopters use servos and a gyro, it's advisable to use a 1200mAh battery for receiver power.

Collective vs. Non-Collective Pitch

After more than 15 years of evolution, there are still some non-collective-pitch helicopters marketed today. A non-collective-pitch machine isn't a particularly good choice for a new heli flier. Many people are attracted by the usually lower price on the non-collective machine, but if you spend $200 on a helicopter and don't learn how to fly it, you've wasted $200. In contrast, if you spend $400 and do learn to fly it, the money is well spent. It's not *impossible* to learn to fly with a non-collective helicopter—it's just more difficult. Model airplane fliers wouldn't suggest that beginners start flying a biplane or a scale jet, but they'd advise them to buy something suitable for training. We've all seen ads that say, "Will perform AMA's full turn-around pattern, yet docile enough to make your first landing." With modern helicopters, this is absolutely true! Just make some electro-mechanical adjustments to upgrade your machine from a basic flight trainer to a fully aerobatic helicopter.

It will cost less to repair a non-collective-pitch rotor head following a crash, but the more positive control available with a collective-pitch machine makes a severe accident much *less likely*. Think

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ROTARY TRANSITION

(Continued from page 83)

about this: When you chop the throttle on a non-collective machine, you'll come down as the rotor speed decreases. However, when you chop the throttle on a collective machine, the pitch decreases and you'll "glue" your machine to the ground, so a gust of wind cannot possibly tip it over after it has landed. This isn't usually the case with a non-collective machine.

Gyros

Most fixed-wing R/C modelers don't use gyros. A new heli flier might truthfully say that a gyro is helpful, but not necessary. I say it's about as necessary as having an instructor standing by for your first fixed-wing landing! Since helicopter learning starts from the ground, your confusion will be reduced by 25 percent if unwanted yaw movements are compensated for automatically. A good gyroscope will reduce learning time considerably, and there are many on the market. I fly with stick priority and non-stick priority gyros, and I've had good results with both. For competition, I prefer a non-stick priority multi-adjustment gyro like those by Futaba* or JMW*.

Final Setup

I purposely left this until last, because it's the *most* important information. Airplanes will fly with many defects, e.g., warped wings, wrong CG, no rudder, etc., but a helicopter *must* be in *perfect* working order to fly well! Follow the manufacturer's recommendations closely, but to be sure of your setup, have an experienced heli flier take a look at it. Tracking and blade balance are extremely important, so don't attempt a first flight until you're sure that your setup is perfect.

Helicopter flying is like learning the piano; you have to *practice* regularly, and you can't just do it every other weekend. Early efforts pay off, and you'll eventually impress everyone with your expertise. Happy hovering!

**Here are the addresses of the companies mentioned in this article:*

Futaba Industries, 555 W. Victoria St., Compton, CA 90220.

JMW; distributed by Miniature Aircraft USA, 2324 N. Orange Blossom Trail, Orlando, FL 32804.

ROBBE SCOUT 60

(Continued from page 55)

material, and I've never known one to wear out. The main gear is also symmetrical, and both sides can drive the tail rotor. This feature is really handy; if one side is damaged in a crash, etc., you won't have to buy another gear.

- Cone Starting: The top-mounted cone-starting system is dual ball-bearing supported for smooth operation and long life.
- Canopy: The canopy for the Scout 60 is slightly larger than previous Schluter canopies, but it's also slimmer and possibly more aerodynamic. It fits over the servo-tray bulkhead and is kept in position with a rubber band. This protects the radio area from dirt and allows the canopy to be installed or removed in seconds. This mounting method, as well as the flexible plastic used in the canopy, also allows the canopy to pop off during a crash—usually without sustaining damage.

THE KIT: Although the written instructions take for granted that you have a basic understanding of the helicopter, the large blowups of the helicopter almost

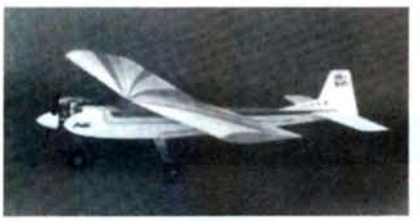
(Continued on page 96)

Product News

D&R THUNDERBOLT

In the tradition of the great Corsair and Mustang, D&R Aircraft Mfg. introduces the new sport scale P-47 Thunderbolt. The P-47 is a deluxe kit in every way. The wing loading is lighter than most models half its size, and flying characteristics are second to none. The wingspan is 85 inches, with 1,400 square inches of wing area. Recommended engines range from the Supertigre 3000 to the Quadra Q-50. The finished weight is between 10 and 20 pounds. The fully sheeted fuselage and wings come complete with a fiberglass cowl and canopy, decals and all the hardware needed to complete the kit.

For more information, contact D&R Aircraft Mfg., P.O. Box 23056, Austin, TX 78736.



AIR KRAFT T-40

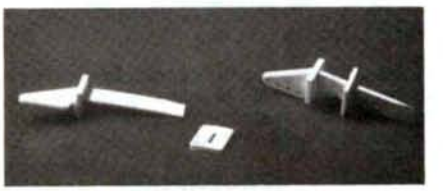
Air Kraft announces the T-40—the first in a new line of precision pre-built balsa kits that are ready for final assembly and covering. The T-40 is constructed of balsa and plywood, and it features a foam wing that's also balsa sheeted. All components are hand-built and sanded, so only the wing halves need to be joined with epoxy and the tail surfaces attached to the fuselage before covering or painting. The T-40 has a wingspan of 60 inches, a wing area of 640 square inches, and a fuselage length of 47 inches. It weighs 4½ to 5½ pounds and will accommodate a 30 to 50 2-cycle or a 40 to 61 4-cycle engine.

For more information, contact Air Kraft, 4104 Lark Ln., Houston, TX 77025.

DREMEL FREEWHEELER

Dremel's new Freewheeler is a cordless Moto-Tool that allows for quick, easy indoor or outdoor repairs—without the need for a wall outlet. The Freewheeler can use the accessories and attachments that are available for the 120V corded Moto-Tool. This two-speed tool uses a 6V high-torque motor powered by five Ni-Cd batteries. Operating speeds are 15,000rpm and 20,000rpm. The Freewheeler is available in tool-only and kit forms. Model No. 850 includes the Freewheeler and the charger. Model No. 8500 includes the tool, the charger stand and 30 accessories.

For more information, contact Dremel, 4915 21st St., Racine, WI 53406.



DYNAFLITE ZIP-HORN

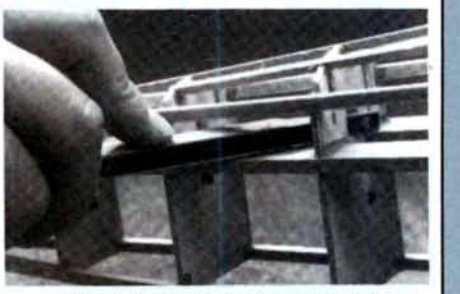
The Zip-Horn, a revolutionary control horn, eliminates problems associated with lining up and drilling holes in control surfaces. No more screwdrivers slipping off tiny screw heads and poking holes in rudders or other control surfaces. Simply cut a slit through the control surface, push the serrated stem through, cinch with the backing plate and cut off the excess.

For more information, contact Dynaflite, P.O. Box 1011, San Marcos, CA 92069.

AIR FLAIR EXPRESS

The Express joins the Impulse Plus in Air Flair's expanding line of big birds. The Express is a constant-chord, conventionally geared, mid-wing sport design for 1.2 4-cycle to 1.5 2-cycle engines. The fuselage, cowl, wing and tail surfaces are of built-up construction, with the front of the fuselage skinned with 1/32-inch plywood. With a wingspan of 81 inches and a wing area of over 1,100 square inches, this big bird will perform solidy.

For more information, contact Air Flair, P.O. Box 2075, Fairborn, OH 45324.



MARCH ACCU STICK

This innovative 6x¼-inch abrasive hand tool was developed specifically for hobbyists, technicians, machinists or anyone who needs to sand detailed surfaces. The Accu Stick has two different working surfaces, and the entire abrasive belt can be economically used. Its chemical- and impact-resistant material can be contoured for special applications. The tools and wet or dry belts are color-coordinated for easy size identification. The five grit sizes are: 120, 240, 320, 400 and 600.

For more information, contact March Products, Dept. 200, P.O. Box 358, Lakewood, OH 44107-0358.

Descriptions of new products appearing in these pages were derived from press releases by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News,** or guarantee product performance. When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Model Airplane News.**

COSMOCON AERROW 70

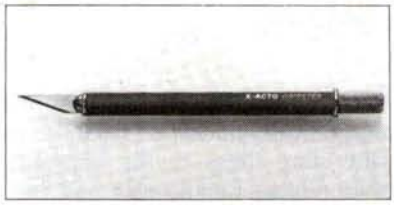
With 85 years of combined engine experience, Klaus Nowak and Ron Chapman have realized their dream of building the best 2-stroke engine available. The Aerrow 70 has a displacement of 4.27 cubic inches (70cc), six transfer ports with a rear exhaust, a custom sand-cast crankcase (for durability), a battery ignition with throttle-coupled spark advance, a reed-valve inlet with big-bore carb (for instantaneous throttle response) and an impressive 7hp rating at 9,000rpm.

For more information, contact Cosmocon Ltd., P.O. Box 189, Agincourt, Ontario, M1S 3B6 Canada.

J'TEC INSTRUMENT KITS

J'TEC introduces their new Scale Instrument Kits, available in 1/3, 1/4, 1/5, 1/6, 1/7, 1/8, 1/9, 1/10 and 1/12 scales. With this selection of 83 representative instruments (including World War I, World War II, General Aviation, Golden Age, Jets, Cars and Boats), almost any true-to-life instrument panel can be made. Twenty instrument bezels with clear plastic faces are included. Detailed instructions show various ways of making all types of instruments—the easy way—for museum-quality results.

For more information, contact J'TEC, 164 School St., Daly City, CA 94014.



X-ACTO GRIPSTER

New to the X-Acto line of knives and blades, the Gripster features a rubberized, extruded barrel that gives the knife a soft covering for a comfortable, firm grip. A rear release mechanism allows safe, easy blade changing. The anti-roll stop—an octagonal aluminum nut at the base of the barrel—eliminates roll. The Gripster features the popular No. 11 fine-point blade, but accepts more than 10 other X-Acto precision blades. The Gripster is available in five colors: black, blue, gray, red and teal.

For more information, contact X-Acto, 230 S. Broad St., Philadelphia, PA 19102.

GREAT PLANES O.S. PACKS

For easier maintenance of O.S. engines, O.S. introduces Maintenance Packs. These packs contain some of the most requested parts for O.S. engines: drive washer, prop washer, prop nut, screw and gasket sets, thrust washer, needle, throttle-stop screw, air-bleed screw, rubber carb gasket, carb fixing screw and muffler fixing screw. (Four-cycle packs are slightly different.) The O.S. Maintenance Packs are now available for the following engines: 40 and 46 SF and RF, 61 SF-H and RF-H, FS-40 Surpass, FS-48 Surpass, FS-120 Surpass, 28 F-H, and 50 FSR-H.

For more information, contact Great Planes, P.O. Box 4021, Champaign, IL 61820.

UMP SAITO FA-300 AAC

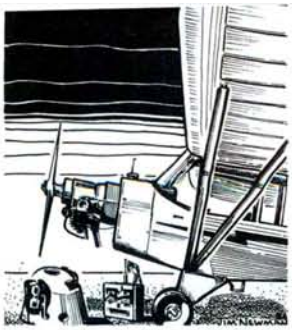
The Saito FA-300 is the big brother of the FA-270, and it has the running qualities for which the 270 has become so well-known. The FA-300 borrows the same high-cam mechanism from the FA-120S (Gold Head) and it's the most powerful big-twin 4-stroke engine in the world. It's perfect for 1/4-scale models. The practical rpm range is 1,600 to 8,000, using props in the 18x10-14, 20x10 and 22x10 sizes.

For more information, contact United Model Products, 301 Holbrook Dr., Wheeling, IL 60090.

JMP DYNAMAX FAN

The Dynamax Fan System has been developed through the efforts of a leading General Electric aerodynamicist and Tom Cook of Jet Model Products. The new Dynamax II fan unit offers further refinement and performance gains over the standard Dynamax. This is accomplished through the incorporation of a revised engine mount and an aerodynamic center-body fairing to reduce internal duct drag. A pressure-equalization scoop is molded in to ensure "clean" air to the carburetor.

For more information, contact Jet Model Products, 304 Silvertop, Raymore, MO 64083.



Giant Steps

by DICK PHILLIPS

I'VE PREVIOUSLY DISCUSSED the creation of a large plan for a 1/5-, 1/4- or 1/3-scale model. As mentioned last month, the fuselage is the major undertaking in any plan design. In this final section, I'll finish the plan by working on the fuselage and discussing the details which follow such completion.

Keep in mind that cross sections of the airplane are needed in order to correctly shape the fuselage. The shape of the fuselage is shown on a plan view and a profile, but it doesn't provide the actual sections needed to produce the fuselage. In most cases, good three-views showing sections of the original, will provide the required drawings. If these fuselage shapes are very straightforward, they can be scaled to the correct size and transferred to the model plan. However, there are many airplanes that require the transferral of irregular shapes to the drawing.

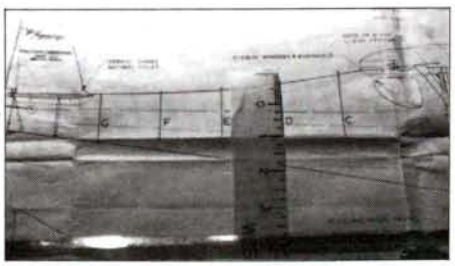
These shapes may be transferred using different methods. The grid method, described earlier, works quite well, but it sometimes requires a little "fudging" to get the right fit. Also, the drawings on the three-view show the outside of the shape of the fuselage in cross section. If you plan to sheet the outside of the model, you'll need to reduce the size of the formers to accommodate the thickness of the planking. If the fuselage is partly sheeted and partly fabric-covered, be sure to take this into account when drawing the formers and bulkheads.

As mentioned in a previous article, there are different ways to construct the fuselage. Working these decisions into your plan may lead you up a blind alley, so be prepared to re-work certain aspects. Don't despair; a certain amount of trial and error is to be expected.

You'll need to establish a base line from which to work. If the thrust line or fuselage center line are shown on the three-view, either will work. If not, use any line you like or draw one on the three-view. Again, to establish a point of departure, you may use the line of the leading edge of the cowl, the rear of the prop, or any other line which suits you. If the point of reference is the same on both plans, you're in business. Measure with the scale ruler that we made previously, taking measurements off the three-view, converting them to the appropriate measurement for the plan and putting them in place.

There are so many different types of fuselage that it's impossible to go into all of them in detail here. Using the experience you've gained from drawing the other parts of the plan, transfer the fuselage to your larger drawing. (If this is your first attempt, you can see why the choice of a relatively simple structure was important.)

The difficult task is producing a plan that permits the building of an almost *exact* scale model of the original. This means using dowels to approximate the original metal tubing, so that the fuselage is positioned and shaped like the original—no mean undertaking by any standard, but it *has* been done. The best advice is to use the KISS (Keep It Simple, Stupid) principle. Avoid getting into complicated and difficult building sequences.

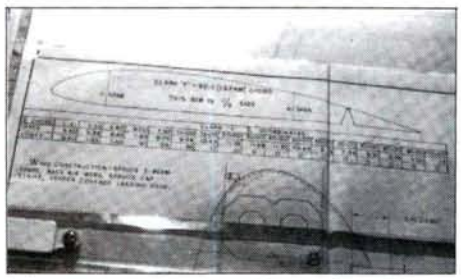


Measurement being taken of the distance from the thrust line to the fuselage edge. This measurement is then scaled to the proper dimension and transferred to the new plan.

Add all the necessary details and keep everything in balance. You could add so much detail that it becomes difficult to read the plan, and that's as bad as having too little. How much is too little or too much? That question will be answered when you build your "proof" model. Ah, you ask, what's a proof model? It's the one you built from your own plan that "proves" it's possible to do so with the information on the plan sheets.

As suggested earlier, draw your plan on Mylar for ease of reproduction. When it's completed, take it to the local blueprint shop and have them run off several copies. Set one of these copies aside as your correction copy and build from another. You could also use one copy to make the patterns you'll need for the parts. Doing this, you won't have to cut up the one from which you are building.

As construction progresses, there will be parts which don't fit, and things you wish to alter. Note any problems on the correction copy *as you come to them.* In this way, all the changes will appear on the plan sheets and can then be incorporated onto the Mylar original. When the model has been built and flown, you can make final changes to the original plan. You'll then have an accurate plan to use or market, and it will produce a flyable model.



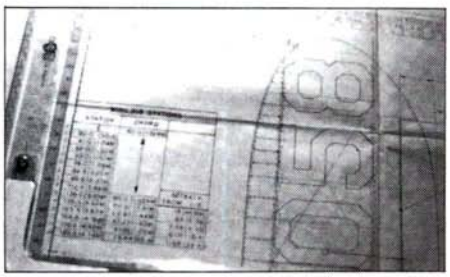
Wing construction is made simpler with the airfoil ordinates included in a chart on the plan sheets.

The inboard profile provides the detail of the original airplane. Whether it's included in the model or not, is the designer's option.

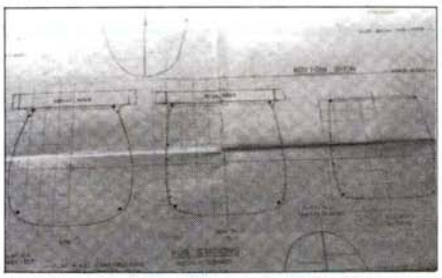
Naturally, the Mylar original should be marked in pencil to begin with. When the plan is firmly in place and no further alterations seem necessary, this may be inked. However, most modern drafting pencils (if chosen carefully) make a heavy-enough mark to reproduce quite

well without going through the inking process. If the plan is accepted by a magazine for publication, they'll ink it for reproduction.

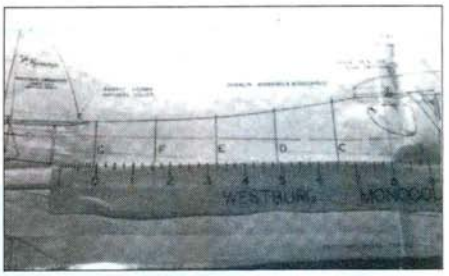
While building the proof model, take pictures as you go along. If the model results in a marketable plan, the photos will help in the preparation of an instruction booklet, and they may also be used when you submit the plan to a magazine, along with a construction article. Pictures



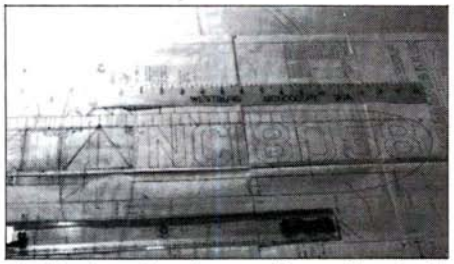
Wing rib locations are also listed as to their position within the wing. This can add dramatically to the scale realism of a model built using such information.



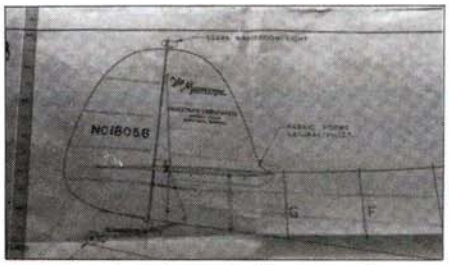
Fuselage cross sections are important for proper plans design. The scaling squares were added by the plan designer for ease of reproduction in another size.



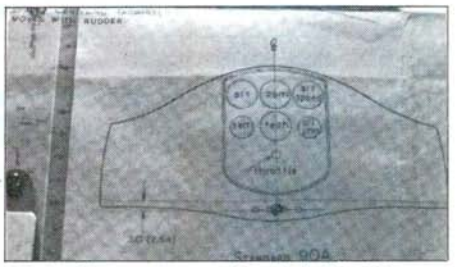
Lines C, D, E, F and G were added by the author, to establish points on the rear of the fuselage. These points establish the form of the fuselage.



The Westburg drawings provide excellent detail. Scale rib positions and the location of the registration are shown. The line of the spar or the leading edge may be used as the reference line for enlarging to the model scale.



Scale details such as the shape, location and size of the Monocoupe logo are also shown on the Westburg drawings. Great for transferring such detail to a model plan.



Minimal instrument panel typical of the 'Coupes. Easily duplicated for a scale model cabin interior. Panel is at $^1/_5$ scale rather than at $^1/_{10}$ scale like the rest of the three-view.

of the finished model are also required, and of course, a few of them should show the model in the air.

Producing your own plan could provide you with an unusual model that just might be your entry into the winners' circle at a scale contest. Such a plan can also produce an appreciable return on the time invested in it. (One modeler has sold several hundred copies of his plan at $30 a piece.) Drawing your own plan can be a rewarding exercise. It's not the easiest thing in the world, but it could open up a new area of modeling for you. Some companies purchase plans outright, others pay royalties on sales; you just have to cash the royalty checks!

Good luck with your venture into plan design. I'm sure you'll find it challenging, rewarding and educational.

Here are some addresses that you might find useful:

Photo Enlarging of Plans:

Brownie's Blueprint, 1119 G St., Sacramento, CA 95814.

ESPA, 939 Goodale Blvd., Columbus, OH 43212.

Handy & Boesser, Inc., 569 Broad St., Newark, NJ 07012.

Building Big Is Beautiful, VIP Aero Publishers, Inc., P.O. Box 16103, Colorado Springs, CO 80935.

Construction:

The EAA (Oshkosh, WI) has several soft-covered books which detail full-scale home-built construction, and are a good source of ideas. *Building The Custom Aircraft With Wood, Vol I; Building The Custom Aircraft With Wood, Vol II; Wood Aircraft Building Techniques.*

Documentation Sources:

AAHS, 2333 Otis, Santa Ana, CA 92704.

Aero Graphics, P.O. Box 3444, University Stn., Columbus, OH 43210. *Color slides of WACO airplanes.*

American Air Racing Society, 4060 West 158th St., Cleveland, OH 44135. *Good source of racing planes information. Publish Kerka three-views (definitive).*

Antique Airplane Assoc., P.O. Box H, Ottumwa, IA 52501. *For reference to owners and pilots and clubs of old airplanes.*

Brandly, Ray; National WACO Club, 700 Hill Ave., Hamilton, OH 45015. *Information on WACO aircraft.*

Burns, John W.; Kit Collectors Clearing House, 3213 Hardy Dr., Edmond, OK 73034. *Publishes book listing all plastic model kits ever made.*

Collect Air Photos, P.O. Box 14234, Milwaukee, WI 53214. *Leo Kohn. Books and small photos.*

Ealy, Jim, P.O. Box 120, Pottsdown, PA 19464. *Extensive collection of sailplane data.*

Gleason, Dick, 1704 29th Ave. SE Rte. 2, Box 125, Austin MN 55912. *19,000-entry list of scale drawings (magazines). Has about 5,000 three-views available.*

(Continued on page 114)

ROBBE SCOUT 60

(Continued from page 86)

make the instructions unnecessary. (But I'd never recommend that you build a helicopter *without* reading the instructions!) The Scout 60 is very clearly depicted on four large sheets that are useful for periodic maintenance and repairs.

CONSTRUCTION: Because the Scout 60 is built in such a straightforward manner and the instructions are so clear, I'll only point out where caution should be used and describe techniques that may be useful.

In the instructions, the manufacturers stress the need for *safety*, both while building and while flying, and I endorse their warnings.

Each of the 16 main building steps has a corresponding numbered bag of parts, and this makes it very easy to keep the parts separated and to follow the instructions.

The third step deals with the assembly and installation of the fuel tank, but caution is needed here. The front fuel fitting that feeds the engine is mounted to the bottom of the jar-like tank, but don't drill the hole for the fitting near the seam of the tank. This seam is a little thicker than the rest of the tank, and it won't allow the fitting to seal properly. Also, the cap of the tank is screwed into position, but to prevent it from coming loose during flight, I also recommend that you put a little silicone rubber on the threads during assembly. This small amount of silicone won't stop you unscrewing the lid if you need to at a later date.

The tail-rotor gearbox is assembled in Step 10, but I found that the top access hole to the setscrew (the one aligned with the tail boom) didn't allow access to the setscrew. This problem is easily solved by enlarging the hole toward the front of the housing before joining the two gearbox halves. Check this before assembly by fitting the drive gear into the housing and checking the hole/setscrew alignment.

Step 13 is the assembly of the main rotor head. Be careful when mounting the blade-holder arms to the blade holders. These arms are mounted with 3mm screws and small nuts (No. 3526) fitted inside the blade holders; too much force while tightening these will easily strip the threads on the nuts.

Assembling the front cabin structure (Step 14) isn't difficult, but at first I didn't get the servo-mounting beams spaced correctly. Although I left enough room between the beams to clear the servo, I didn't have enough room to accommodate the mixer, which is assembled in the next step. With hindsight, I recommend that you first assemble the mixer and servos, which are easily kept together with a rubber band in a neat package. For a perfect fit the first time, the required measurements can be made on the completed mixer unit.

Step 15 also described the complete set-up of the helicopter, which incorporates the use of a metal jig (supplied with the kit) to accurately adjust the swashplate. These instructions were "right on," but a little experimentation with the output arm of the collective servo is needed to get the required collective throw in both directions—especially if you're setting up the Scout 60 for inverted flying.

My trusty Futaba* PCM helicopter radio is used for guidance, and my gyro is the Futaba G154. Electrical power is

furnished by a 1,200mAh aircraft-grade battery pack from SR Batteries*. A super-quiet Schluter muffler makes for really quiet flying, but doesn't noticeably reduce the power of the O.S. Max 60 H-ABC engine.

PERFORMANCE: I don't think any helicopter can really fly "right off the board," but the Scout 60 comes close. Minor blade tracking and a tail-rotor adjustment were all that was needed to produce a smooth, very responsive helicopter. I cut the flybar paddles off by 20mm, and with the flybar weights to the outside, the helicopter is very stable, but responsive. I'll experiment further with different paddle lengths and flybar weight positions, but this is certainly a place to start.

The bright color scheme and large canopy make the Scout 60 very easy to see in flight, and this certainly helps overall control and maneuvering. I also kept the horizontal fin in the horizontal position, but will later experiment with different settings to see the effect on fast forward flight.

Flying and aerobatics are everything you'd expect from a Schluter machine. Fast forward flight produced large, symmetrical loops, and rolls were smooth and axial, using about -2 degrees as it flew inverted. Because I have the Scout 60 set up for inverted flight, I only have 10+ degrees for autos, but that's enough to produce soft, controllable touchdowns.

By now, you should be able to tell that I'm not only impressed with the entire Schluter line of helicopters, but also with the Scout 60. From building to trimming to flying, the Scout 60 is easy to understand and work on, and it rewards you with smooth, precise flying. Whether you're a novice looking for your first durable helicopter, or an expert looking for a helicopter that will take you to the winners' circle, the Scout 60 is for you.

**Here are the addresses of the companies mentioned in this article:*

Robbe Model Sport, Inc., 180 Township Line Rd., Belle Mead, NJ 08502.

Futaba Corp. of America, 555 W. Victoria St., Compton, CA 90220.

SR Batteries, Box 287, Bellport, NY 11713. ■

GMP STORK

(Continued from page 28)

The flat cog belt runs through the boom and provides tremendous power to the tail rotor. A U-shaped octagonal clamp serves multiple duty on the boom by providing a mounting point for the molded-plastic horizontal stabilizer and tubular boom braces, while capturing the tail-rotor collective pushrod. The vertical fin attaches to the side of the tail-rotor coupler. With all the flat sides provided on this tail boom, you never have to sight along this part or that one to be sure that the tail-rotor shaft is perpendicular to the main, or that the vertical fin is really pointing straight up. Take my word for it; bolt it together and forget it!

The tail-rotor collective mechanism is a shaft-slider type that mounts onto the shaft and is followed by a screw on a hub. (Liberally apply threadlocker here.) Tiny double-ended clevises attach to the outer ring with small shoulder bolts and connect to the two-piece blade-holder assembly. The tail-rotor blade-holder assembly is a GMP standard and has both thrust and

GMP STORK

ball bearings installed to handle the power available in this system.

As mentioned, the tail rotor is driven by a flat cog belt that receives its momentum from a power take-off unit mounted inside the chassis main frames. This ball-bearing assembly has a vertical connecting shaft that mounts a pulley on one end and a small gear on the other. The gear meshes with the main rotor gear for power transfer. Obviously, the pulley on the topside is the takeoff point for the tail belt. When the tail tube is pulled tightly towards the rear and secured by tightening the front coupler screws, the tail system turns smoothly and with little resistance.

The main- and tail-rotor blades are wooden, and both blade sets must be trimmed to the proper length for the size of engine used. The dimensions are in the instructions; they can be used as a guide and may be "fudged" a little without dire consequences. A light sanding and a balance check showed that the blades in my kit were almost exact. After covering them with the provided heat-shrink material, it took only a ½x2-inch piece of extra tracking foil to balance the main rotor system perfectly. The extremely light tail blades required no additional work.

Canopy assembly can be completed according to the instructions, and can be painted with your favorite paint. Attachment is slightly tricky and must be accomplished before the final painting. The canopy is held on the front frame assembly by cutting two keying slots on the canopy bottom to mate with protruding tabs on the main-frame floor. A dimple on the canopy top locates the hole to accept a slotted rubber O-ring. To attach and then mate the tabs through the bottom slots, lift the canopy nose until the O-ring hole pops onto the mounting post on top of the servo tray. A plastic cam-lock-type piece is then inserted into the post hole and locked with a quarter-turn to the right. It's neat, clean, and *it works!*

Mechanical set-up of all linkages is made easy with clear instructions showing the correct positions of all the servo-output wheels/arms. The transmitter stick positions in relation to the servo output throughout the control movements is clearly defined. The earlier assembly of the pushrods will put the setup close to final adjustment—so close that first liftoff will offer no surprises.

At this point, the assembly is complete, and you have a sleek SE Stork. If you're used to the 10-pound-and-over helicopters, the Stork's finished weight will surprise you. With five servos, a 1,200mAh battery and a gyro, it weighs slightly less than 9 pounds!

PERFORMANCE: Flying this model is an exercise in smiling. From the first liftoff, the positive yet gentle response immediately gains your confidence. This machine is precise and very, very smooth. Minor transmitter trim adjustments had the Stork dialed-in and ready for forward circuits. The recommended throttle/collective relationship was ideal, with the engine just breaking into the fast 4-cycle at liftoff and settling into 2-cycle at the hover. Recommended swashplate throws were positive, with instant response to any stick movement. A couple of quick jabs on the collective presented vertical leaps of several feet in the blink of an eye. There's something to be said for a light airframe wrapped around smooth horsepower.

Forward flight presents no problems for the helicopter, but it can cause the pilot some anxiety. The Stork accelerates and flies very quickly, and it does so with very little addition of collective above the hover position. Flight maneuvering is agile, and it gives you the feeling that this machine is almost lighter than air. Descent is gentle with collective to zero, and maximum negative (four degrees) is required for rapid downward travel.

Everyone wants to know about aerobatics! A few years ago, most modelers wanted to know how a new design *hovered* and what *unusual* flight characteristics it displayed. Today, everything is assessed in number of vertical rolls or consecutive loops. While most modelers want their investment to be capable of this level of performance, few actually spend most of their flying moments testing the model's limits. The SE Stork performs aerobatics smoothly, but not with the snappiness of the more advanced rotor heads, which are designed solely for that purpose. The DDF head is designed to be an all-around type that encompasses smooth, predictable hover, positive straight-tracking forward flight and graceful aerobatics. Loops are larger than those of the Competitor Pro, and rolls are longer and a little slower. Sure, put a Pro head on the Stork, and it may be better than the Competitor because it's lighter, but you'll sacrifice some of the other flight modes.

Autorotation? Typical GMP/Hirobo. Full-down collective (again, 4 degrees negative) produces a rate of descent that makes you wait a while for the bird to reach the ground. Recovery takes about half collective to stop the descent, and the remaining half to settle to a consistent soft landing. In a gentle breeze, the nose must be lowered considerably to achieve the same results. Either way, the comfortable descent of this machine places it among the best available for learning the scary and dreaded auto.

Negatives? Compared to others in its class—none! However, if you compare it with ships designed for higher performance, I'm sure you'll come up with a list of shortcomings.

Mechanical problems appearing after

a break-in period? Sure. First the tail boom began to creep forward, due to the tension on the drive belt. To eliminate this, pull the boom back until the belt is taut, and snug-fit the forward-mount screws. Drill a 1/16-inch-diameter hole through the plastic collar and into the tail boom. Seat a short sheet-metal screw through both. It won't move anymore.

Second, the main rotor blades go in and out of track in various flight modes. Picture this: Blade track is perfect in hover and gentle forward flight. You decide to rip around the sky with tight turns, maybe a roll or two, then zoom in for a quick stop to the hover. Whoops!—the blades are out of track by half-an-inch or more. You land, twist a link, jump back to the hover and find that the blades are worse in the other direction. Landing again, you twist the same link back to where it was, and darned if the blades aren't in perfect track again. From around the country, I've heard of "fixes" that border on silly! Quite simply, the individual blade dampers aren't matched. Each blade holder has an adjustment ring that compresses the dampener rubber inside the seesaw. When the blades go out of track due to high-G maneuvers, one blade dampener is tighter than the other. Pick either blade, high or low, and move the dampener ring one-sixteenth of a turn—in to tighten, out to loosen. Fly for a while, to check results. It may take a day's flying to get it right.

This model is for beginners, intermediate and advanced fliers, and it offers predictable, confidence-building flying. Maintenance is minimal, but all parts should be checked regularly for normal or stress-related wear.

The GMP Special Edition Stork does well in the value-for-money category, especially since it's designed to be an all-around helicopter, rather than one specifically designed for a narrow, specialized performance envelope.

An additional attribute of the Stork will be evident when you take a close look at GMP's newest helicopter, the high-performance Legend. What? You say the Legend looks a lot like the Stork! You're right! The Legend traces its roots directly to the Stork. The folks at GMP saw the potential in Stork's lightweight chassis and low parts count. Knowing the American modelers' propensity for hot, wild and wicked flying machines, they decided to redesign the Stork to the performance level demanded by that type of flier. Since the Legend provides a direct upgrade path for current Cobra and Competitor owners with its add-on parts kit, and since the Stork and the Legend share multiple parts groups, the SE Stork, too, can be upgraded to match the Legend's performance levels. Can't see much wrong with *that* kind of value built into the GMP SE Stork.

**Here are the addresses of the companies mentioned in this article:*

Gorham Model Products, Inc., 23961 Craftsman Rd., Calabasas, CA 91302.

O.S.; distributed by Great Planes Model Distributor, P.O. Box 4021, Champaign, IL 61820.

Enya; distributed by Altech Marketing, P.O. Box 286, Fords, NJ 08863.

SPORT 500

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500. It came right out of one of my airplanes, and it's about as basic as you can get. It has absolutely no "bells and whistles," with the possible exception of a small chime, that being a servo-reversing capability. The only "helicopter-unique" component in this entire project was the Futaba gyro, which I installed according to the manufacturer's instructions. I also used an SR* 1,200mAh pack, figuring

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SPORT 500

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that the gyro would consume additional power and could probably use some additional nose weight anyway. The equipment fit with no problem. The manufacturer obligingly refers to the control functions of the servos in terms the beginner understands: rudder (tail-rotor pitch), elevator (fore/aft cyclic) and aileron (left/right cyclic).

FLYING AND ADJUSTMENT: The set-up is described in six steps that include preliminary trim adjustments, which I followed implicitly. I had decided early on that my flight training would undoubtedly take longer than deadlines would allow, so I called on Ron Farkas (who reviews the Baron 30MX elsewhere in this issue) to try to fly the Sport 500 for photographs. (Kind of an insurance policy!) The O.S. fired right up and after a number of run-ups and wind-downs to get it peaked, Ron lifted it off in a hover. He said that it felt solid, that the blade tracking was right on and that it needed additional "right rudder," as he had all the trim in and it still required right stick to hold the tail straight. After making these adjustments at the tail-rotor clevis, he was off again, into a hover and forward flight, and back to hover for additional photos. Sure looked good to me! We refueled and did it again, at which time Ron felt that *I* should give it a try. Taking the smart option, I attached the helicopter to my next insurance policy, the Rotopod from Dobyns Enterprises*. This is a unique training device that consists of a molded-nylon center fitting on which are installed five ½-inch dowels terminating in whiffle-type balls. The connection to the helicopter is made through spring clips on a gimballed plate attached to the helicopter skids. I came to really appreciate this clever device!

We attached the Rotopod so Ron could check the handling and determine if there was sufficient power available to lift everything. No doubt about it. At max throttle (with the needle-valve setting we were using), the Sport would lift off, get to about five feet and go no higher! Perfect! Then...disaster! During let-down, so I could give it my first-ever try ... WHHHIIZZZ ... both tail rotor blades departed! The machine was only about six inches off the ground at the time, and it sustained no additional damage. A phone call to Hobby Lobby to explain my dilemma disclosed that I had received an *early* kit which didn't include a mod package with the parts and instructions required to eliminate the problem. Jim Martin, Hobby Lobby's president, checked the kits in his inventory and verified that they all contained the appropriate updated material, and he sent the parts to me overnight. The problem was in the tail-rotor bearings, which, due to an error on the part of the bearing supplier, allowed identical looking, but different load-bearing-characteristic units to find their way into a small number of kits. The retrofit was accomplished in less than an hour, and we were soon heading back to the field—this time, under the watchful eye of Nick Ziroli, Jr. He flew it to make sure the trims were still OK, since I had disassembled the tail rotor; he blessed it, and again strapped on the Rotopod.

I advanced the throttle cautiously and nothing happened; more throttle—whoops—it's bouncing around ... what

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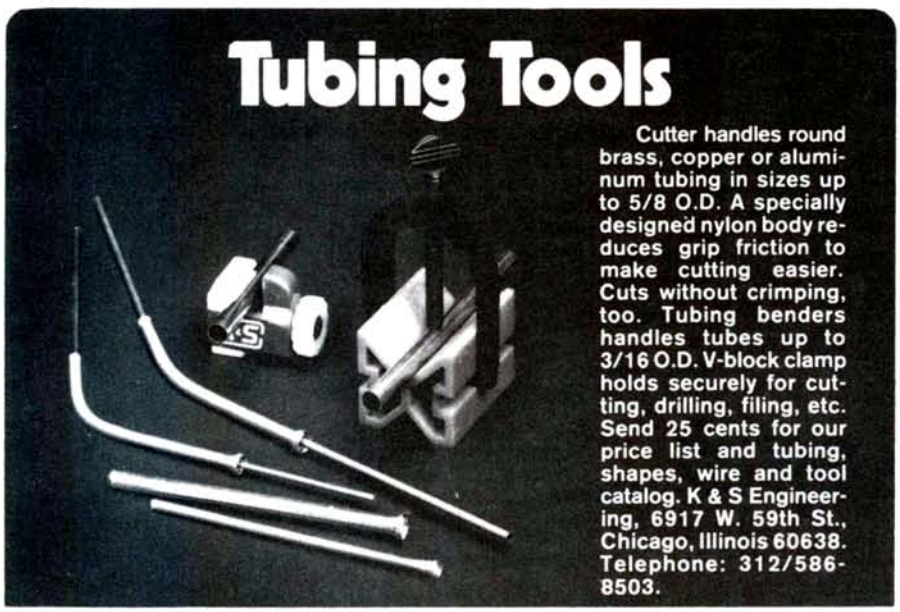

SPORT 500

(Continued from page 102)

now? ... tail rotor, rudder, whatever—whoa—stop that swing, keep the nose into the wind, tail in front of you (there goes the tail again), now the nose is looking at me, it's off the ground and going forward ... This damned thing is chasing me!! Off the throttle and, fortunately, it settles to the blacktop, sliding rather ungracefully on the whiffle balls... backwards! I notice that both transmitter sticks are full aft, my fingers operating those sticks are shaking, and I'm surrounded by the sound of gleeful laughter that appears to be coming from cars, but is really from my flying "buddies" who have sought refuge! A few more attempts, and I manage to get the Sport 500 hovering, but not without a lot of concentration! I've since put on lots more attempts (I'm not ready to call them "flights" just yet), and I think I'm getting better at it. Most of the time, I can now keep the machine from chasing me, and I've managed a consistent hover plus a bit of forward flight.

Here are my conclusions from a beginner's perspective: It takes a *lot* of practice to become competent *and* confident. It's considerably *more* difficult to fly helicopters than fixed-wing planes. If you like a challenge, this may very well be it. I'll continue to fly the Sport 500 and give you occasional updates when (and if) I progress to the point where I can draw some additional conclusions. I might even try flying a collective-pitch machine, which I'm told makes learning so much easier. That may well be true, but since I've nothing to compare my non-collective Sport 500 to, I have to consider it on its merits. It's inexpensive, utilizes standard R/C airplane components (except the gyro), is easy to assemble (if you pay attention) and has sufficiently comprehensive instructions to enable you to meet the challenge successfully.

I strongly recommend the use of some training device like the Rotopod. So far, it has saved me at least twice its nominal cost by preventing parts damage. I'm not going to conclude this review, because I expect to be back with an update, and maybe my Sport 500 will, at that time, be dressed up in the optional full fuselage.

I end this review with some comments made by Ron Farkas after he'd flown the Sport 500:

"With the engine peaked, the liftoff was very clean. Despite its size, it's very stable—many times more stable than a smaller, non-collective machine. The control response is 'soft'—might be considered 'sluggish' by an experienced flier... typical of fixed-pitch (non-collective) machines. The response to throttle input is delayed, but it has plenty of power. It's smoother than I expected; flight doesn't seem jerky."

Unlike some of the airplane reviews I've done, I can't conclude any more than I have up to this point. I *will* say that you can have *a lot* of fun without committing big bucks to the endeavor. As I said: If you don't know any better, you can't appreciate the differences! That should just about cover it. I'm having fun, and I'll be back with an update!

**Here are the addresses of the companies mentioned in this article:*

MFA, The Mill, Mill Lane, Worth, Deal, Kent, England CT14OPA.

Hobby Lobby International, 5614 Franklin Pike Cr., P.O. Box 285, Brentwood, TN 37027.

O.S.; distributed by Great Planes Model Distributor, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.

Loctite Corp., 18731 Cranwood Pk., Cleveland, OH 44128.

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SPORT 500

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MonoKote; distributed by Top Flite Models, 2635 S. Wabash Ave., Chicago, IL 60616.

Futaba Industries, 555 W. Victoria St., Compton, CA 90220.

SR Batteries, Inc., 29 Maple Ave., Box 287, Bellport, NY 11713.

Dobyns Enterprises, 1716 Calavera Pl., Fullerton, CA 92633.

HAI SHOW

(Continued from page 50)

military (specifically Navy and Marine Corps) helicopters were shown. I love *all* helicopters, but military machines *really* turn me on.

With a smaller facility and no full-size birds, all the manufacturers brought out their display models. They were all stunning, but one in particular really caught my eye: a 1/10-scale AH-1W Cobra. It was painted in Marine Corps sea camo and it had a full cockpit. One of the Bell Textron reps told me that they paid $20,000 for this model! I dreamed of what it would be like to fly an R/C Whiskey Cobra at the local flying field with my portable stereo blaring Wagner's "Ride Of The Valkyries"—food for thought!

Almost all aeronautical advances have been made by and for the military. The Aerospatiale Dauphin II that the U.S. Coast Guard now uses was originally developed for the French military and called the Panther. The civilian versions of that machine also serve as medivac helicopters for many hospitals in the Midwest. One fascinating fact about this machine is that, by weight, it's 50 percent composite material, much like our R/C helis. The rotor heads on the Dauphin, the A-Star and the Twin-Star are made of almost 100-percent composite material! The gap between the R/C model and the full-size engine closes.

Like the HAI show, the Navy Helicopter Association show left me exhausted but enriched by the knowledge I'd gained. I don't see how anyone can be involved in R/C helicopter flying without also having a profound interest in—even a *love* of—full-size helicopters. Perhaps the relative newness of the sport or the complexity of the machines themselves has prevented many people from building a greater variety of scale fuselages. Seeing all these beautiful display models made me wonder how many R/C helicopter pilots would be added to our ranks if scale helis were the rule rather than the exception.

**Here are the addresses of the companies mentioned in this article:*

Schluter; distributed by Robbe Model Sport, 180 Township Line Rd., Belle Mead, NJ 08502.

Gorham Model Products, 23961 Craftsman Rd., Calabasas, CA 91302.

GOLDEN AGE

(Continued from page 41)

had a long cord with a push-button switch on the end of it for control. The switch was conveniently placed so that it could be grabbed quickly. With the model's engine screaming, you paced yourself from the transmitter so the run required to get the model to hand-launch speed would end at the transmitter, and there you'd grab the switch as you let the model go. In practice, what a relief it was if the model actually got off into level flight and you wound up watching with that switch in hand! As you can imagine, each launch was a new experience in what *not* to do!

Dick goes on to explain that an occa-

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GOLDEN AGE

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sional successful flight was encouraging, and that problems were a result both of inexperience and of equipment shortcomings, and not of the capabilities of the two models.

Success finally came, and Dick tried the entire Live Wire Series. This started with the Champion and Kitten, then on to the Jenny, P-Shooter, Cobra, etc. Later, the Live Wire's aerodynamics and construction techniques were the basis for his own successful efforts.

A recent project showed Dick how much enjoyment can still be had building and flying an OT R/C plane. It also gave him the opportunity to finally have the Trainer he wanted 35 years ago!

A friend and modeler, Leon Schnitzspahn, wanted an OT favorite, the L.W. Trainer. For some reason, he has reduced the size by a third and produced a model like the ½A-powered L.W. Kitten, but it retains the classic chunky appearance of the Trainer. Dick couldn't resist this opportunity; he built one too.

Dick's version is powered with a Cox .049 using a Tarno throttle. Unlike the original, which had only one channel, his is 3-channel with rudder, elevator and engine controls. Even so, it weighs only 18 ounces, so it's lighter than the original similiar-size Kitten. Another example of modern equipment in OT R/C designs.

Dick concludes by saying that after several ¼-scale projects, the building and flying of this little old R/C plane has been an enlightening experience. The OT construction was interesting, and the flying was a real change of pace. It flies easily (no need to run to launch it!), maneuvers quickly and may be a little overpowered, which adds to the fun! With the original Live Wire paint scheme, this plane radiates nostalgia when in flight.

Leon has developed a construction article and plans. I've reviewed the drawings, and the outlines are authentic. Dick Sarpolus is today well-known for his many fine, often unusual designs which we enjoy with his presentations.

• Stormer plans: Joe Bryant of Tucson, AZ, checked in to say he has finished and is flying a Doug Spreng "Stormer." Powered with an O.S. 45 FSR, the performance is just great. Joe's plans came from John Pond, 253 N. 4th St., San Jose, CA 95109. I guess that John has other OT R/C plans, but so far I've been unable to obtain a list from him.

Until next time...

QUIET FLIGHT

(Continued from page 65)

come up with a much better place than Taft. In the Texaco event, I flew an O.S.* .60 4-stroke-powered Cloud Cruiser for over 58 minutes, and I came in sixth. The first-place model flew for over 1 hour and 41 minutes. Wow!

Unbelievable Sunglasses

We all know how important it is to protect our eyes with sunglasses. However, if wearing shades could improve your vision—you know, you'd see your models better, farther up and farther out—I bet you'd never ever go flying without them. Well, I've found a pair of sunglasses that do all of this and look good too. They're called BluBlockers, and you've probably seen them advertised in magazine mail-order ads.

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QUIET FLIGHT

(Continued from page 108)

According to their manufacturer, "BluBlockers filter out the ultraviolet and blue-spectrum light waves from the sun. Blue rays have one of the shortest wavelengths in the visible spectrum (red is the longest). As a result, the color blue will focus slightly in front of the retina, which is the "focusing screen" in your eye. By blocking the blue from the sunlight through a special filtration process, and only letting those rays through that indeed focus clearly on the retina, objects appear to be sharper and clearer."

At first, the effect is strange. The lenses are a brownish-orange, and everything you look at seems brighter. Since the lenses remove blue (a primary color), all other colors are slightly changed. The two MonoKote colors that show up best are red and orange; they look almost fluorescent against the sky. This is so effective that at two contests I recently flew in, I was able to fly farther out than the other pilots in my flight group, thus winning man-on-man rounds and securing a better place in the final results.

The BluBlockers aren't just for contest fliers. Anyone who has ever flown just a little too far out will appreciate the effect (especially if it saves a model). You can actually see the shape of your model better, and you'll be able to tell what attitude it's in when it's farther away.

However, like most good things, BluBlockers aren't cheap. They can only be bought from JS&A* for $39.95 plus $3 shipping and handling. But once you wear them, I'm sure you'll agree that they're a bargain! I'm not getting free shades or anything else for this write-up; I genuinely think that they're an exciting product that you should know about.

Well, that's about it for this month. Did you notice that there isn't a "Model of the Month" in this column? I haven't received any pictures of your great-looking models. I'll try to come up with new ones each month, but there *must be* some good-looking planes elsewhere, besides here in Southern California. Till next time; a full charge and good thermals!

**Here are the addresses of the companies mentioned in this article:*

United Model Distributors, 301 Holbrook Dr., Wheeling, IL 60090.

Top Flight Models, Inc., 2635 S. Wabash Ave, Chicago, IL 60616.

Dynaflight, P.O. Box 1011, San Marcos, CA 92069.

Robbe Model Sport, 180 Township Line Rd., Belle Mead, NJ 08502.

Futaba Corporation of America, 555 W. Victoria St., Compton, CA 90220.

QUIET FLIGHT

O.S.; distributed by Great Planes Model Distributors, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.

JS&A, 1 JS&A Plaza, Northbrook, IL 60062 (1-800-228-5000)

GIANT STEPS

(Continued from page 95)

Hall, Art Enterprises, P.O. Box 485, Winter Park, FL 32789. *Limited selection of racing plane drawings. Extensive library; will dig into it for a fee.*

Hannan, Bill, P.O. Box A, Escondido, CA 92025. *Strong on early aircraft.*

Hansen, Brad, 2646 Stanford, Clovis, CA 93612. *Expert plastic modeler on WWI Aircraft. Has book on subject.*

Historic Aviation, 3850 Coronation Rd., Eagan, MN 55122. *Book dealer.*

Holman, Bob, P.O. Box 741, San Benardino CA 92402. *Plans, catalog available.*

House, Walter, 2215 W. 29th St. So., Wichita, KS. *Historian of the Mooney Co.*

Lebrecht, Chuck, 3121 E. Lakeshore Dr., Wonder Lake, IL 60097. *Expert on Porterfield and American Eagle Aircraft. Possibly President Porterfield Club.*

Moffitt, Charles M., 221 W. Simpson, Troy OH 45356. *Owns and sells prints of original WACO Co. negatives.*

National Air and Space Museum, Aircraft Drawings 80-952, NASM, 3904 Old Silver Hill Rd., Suitland, MD 20023. *Lots of drawings, but limited in scope.*

Opdycke, Leonard, 15 Crescent Rd., Poughkeepsie, NY 12601. *WWI Aero.*

Owl's Head Foundation, Transportation Museum. James S. Rockefeller, Curator. *Some strange and wonderful airplanes.*

Ox-5 Club, OX-5 Aviation Pioneers, 419 Plaza Building, Pittsburgh, PA 15219.

Plecan, Paul, 3023 Saratoga St., Riverside, CA 92503. *Draftsman, (the best) of model airplane plans. Has decent library.*

Pond, John, Old Time Plan Service, P.O. Box 3215, San Jose, CA 95156.

Matt, Paul, Historical Aviation Album, P.O. Box 33, Temple City, CA 91780. *Best plans and books going.*

San Diego Aerospace Museum, 2001 Pan American Plaza, San Diego, CA 92101.

Shipp, Warren D., 17199 W. Bernardo Dr., #201, San Diego, CA 92127. *Great photo source. (Since the Wright Bros.)*

Weaver, Maj. Truman C., c/o Wedell-Williams Memorial Foundation, P.O. Box 655, Patterson, LA 70392. *World's best on racing planes.*

Vintage Aviation Inc., Rte. 2, Box 53L, Marion, TX 78124. *Roger Freeman, Limited number of real airplane drawings.*

Editor's Note: *SunShine House, publisher of the "Aviation Heritage Library Series," has acquired the publishing rights to all the Paul Matt drawings. These drawings are highly regarded for their detail and accuracy and a complete list may be obtained from SunShine House, P.O. Box 2065, Terre Haute, IN 47802.*

HELO FUN-FLYS

(Continued from page 18)

tors who might consider acting as sponsors by donating small prizes. Winning a set of rotor blades, a blade covering, a gallon of fuel, etc., makes an already pleasant event even more enjoyable.

Give the sponsors credit for their participation by making copies of their literature and business cards available, and tell them that you intend to do this when you ask for their help.

- Advertising: When the basic preparation for the fun fly is under way, think about advertising. So far, this has been a problem with helicopter events. Use your local newspaper. An ad in the "Sporting Goods" section of the classifieds, including information about the fun fly, the time, the place and the CD's name and phone number, may bring surprising results. The editor may even assign a reporter to cover the event, so giving your club superb publicity. You'll never know

(Continued on page 119)

HELO FUN-FLYS

(Continued from page 114)

if you don't ask.

Print flyers to send to other clubs (even fixed-wing clubs), and ask local hobby shops to display them prominently. Send them several, and include directions to the flying site.

- The Big Day: After all these intensive preparations, it's almost a relief to have the day of the fun fly arrive. Getting an early start on the sign-in roster, impound area and frequency control starts everyone off on the right foot. Discuss safety with everyone as early as possible during a pilots' meeting. Make sure that everyone knows the frequency-control system, the transmitter impound procedures and the safe flying areas. Although the CD and other club members are responsible for safety, everyone present should make sure that unsafe conditions are immediately reported to the CD and quickly rectified.

Crowd control is another safety concern. A simple barrier behind the pit area to keep the spectators back will let them see what's going on, but will keep them away from spinning rotor blades and prevent them from tripping over your prized helicopter

To encourage the participation of beginners, set aside a specific training time, during which *only* they will be allowed to fly. More advanced fliers should be available to offer help and encouragement.

I like to have an area reserved exclusively for hovering. Here, well away from the flying area, instruction in basic hovering may be given.

A fun fly gives many fliers a chance to fly in events never before attempted. Some events can be easily explained, but draw up event sheets describing the more complicated events and what you have to do to win. To ensure that no one leaves too soon, make sure that everyone knows *when* the winners will be announced and the prizes distributed.

Finally, ask how everyone enjoyed the fun fly; there's always *something* that can be improved. Other contestants may suggest ideas or modifications. You can't please all the people all the time, but it never hurts to try!

If you're in the Dallas/Ft. Worth area, please stop by the Mid-West Helicopter Association's flying field. We're planning to hold a two-day fun fly on the last weekend of every other month. For further information, please contact me at 6704 Santiago, Ft. Worth, TX 76133 (817) 346-3368.

SCHLUTER 4-BLADE

(Continued from page 32)

to 35 percent of the chord. This means that the CG of the blade is about a quarter of the way back from the leading edge of the blade, and the manufacturer usually accomplishes this by making the blade of two woods—heavy hardwood near the leading edge and lighter wood for the rest of the blade. If the CG was too far back—e.g., 40 percent of the chord—the flight characteristics of both the rotor blade and the helicopter would suffer. I wanted to point out the approximate location of the blade's chordwise CG position, because it's different on blades used in multi-blade heads.

- The Multi-Blade Head: The Schluter four-blade rotor head is a real work of art, and is similar in design to the Champion two-blade rotor head. Like the Champion, it's fully ball-bearing supported. However, with a head that has three or more blades, there are no flybars or paddles to affect

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SCHLUTER 4-BLADE

(Continued from page 119)

the flight characteristics of the helicopter. This now means the servo has the only input to the rotor blades, so the servo must be both accurate and powerful. Because of this, the manufacturer recommends the use of a higher grade of servo with increased power, and a fully ball-bearing supported output shaft to withstand the loads imposed by the rotor system.

The rotor blades on the multi-head system are also smaller than the two-blade system, since there are now more blades to do the work. Now the CG of the blades has also been moved forward to less than 25 percent of the chord. This forward movement of the CG is needed to improve the aerodynamic stability of the rotor blades, since the stability provided by the paddles is no longer present. Mr. Schluter does this very nicely by routing out the leading edge of the blade to accept a heavy wire. This not only moves the CG forward, but also simplifies the construction of the blade.

- Multi-Blade Conversion: The multi-blade heads for use on the Schluter Champion and Superior come with very good instructions, and by the time you read this, their instructions for the Scout 60 should be ready.

As already mentioned, the Scout 60 is particularly easy to convert to multi-blade operation because of its sliding swashplate. To start the conversion, remove all the linkages between the swashplate and the rotor head. The complete rotor head can then be removed by undoing one bolt. Then the washout unit is removed by sliding it up the shaft. However, the Scout 60 washout unit also acts as a follower, i.e., it keeps the inside portion of the swashplate revolving with the main rotor. Since this unit must be removed for a multi-head operation, you must also have an extra follower similar to that used on the Champion. This complete unit can be ordered from your dealer or directly from Robbe Model Sport.

For the four-blade head, the four balls on the inner portion of the swashplate are left where they are, and a fifth ball is installed in any of the remaining holes. You can then slide the follower down the main shaft and connect it to this fifth ball, but don't tighten the setscrew; this will be done later, during set-up. The four-bladed head can now be added to the main shaft.

ROTOR BLADES: When the steel wire has been glued to the leading edge of the rotor blades, they can be finished in several ways, but I won't go into them here. The instructions suggest adding tracking tape to distinguish each blade. The first blade has the tracking tape near the tip, while each successive blade has the tape placed one width down the blade. Also, when balancing the blades, make sure you match the longitudinal CGs of the blades as well as their balance. Use the Schluter balancer (part No. 1367) for excellent results.

This raises an interesting question to which I don't have the answer. Do all the blades have to be balanced together, or can they be balanced in opposing pairs? If the CG and balance of all the blades are matched, then any of the blades could be used in any position. This means using one blade as a standard and matching the other three to it, which could take a little doing. It would probably be easier to match blades in pairs, which will then be mounted opposite each other. If you consider the normal two-blade rotor head as a pair of main blades with a pair of smaller blades (the flybar with paddles), they certainly aren't all in balance. Then why should all the blades be balanced with one another? As an experiment, I purposely made up two pairs of rotor blades, rather than matching all four, and although I haven't tried them yet, I see no reason why they shouldn't work. We'll see!

SET-UP: With the head in place, first set the correct relationship between the swashplate and the rotor blades. This is accomplished with the follower. However, because of a property of the rotor system called "gyroscopic precession," any force applied to the rotor system will take effect 90 degrees later in the direction of motion. So for a clockwise rotating system, if you want the helicopter to bank to the left, the force must be applied as the rotor blade passes the front of the helicopter. Imagine the rotor spinning slowly with the maximum angle of blade attack being reached as it passes the front of the helicopter. That angle of attack will want to raise the blade. However, because of gyroscopic precession, the resultant force is felt as if it were being applied 90 degrees later in the direction of rotation, which is when the blade passes to the extreme right of the helicopter. That lifting force on the right will therefore make the helicopter tilt to the left, and it's with this knowledge that we'll set up the rotor head.

Turn on the radio, give a full-left cyclic command, and turn off the receiver with the servo in its full-left position. Move any of the four rotor blades to the front of the

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SCHLUTER 4-BLADE

helicopter in its fully extended position and notice its positive angle of attack. If it doesn't have a positive angle of attack, raise the swashplate slightly. Now move the follower until the ball on the swashplate is 45 degrees to the right of the nose. (This is also the highest point on the swashplate, to give the blade its greatest angle of attack.) Lock the follower in this position with its setscrew. The rotor head is now in phase with the swashplate, and this can be easily checked by rotating the head and noting that the maximum angle of attack of each blade is reached as it passes the front of the helicopter.

Now that the rotor system is in place, it has to be set up slightly differently, because there are no paddles to help with stability and control. First, the cyclic pitch (or aileron and elevator controls) will have to be reduced. From previous experience with "flybarless" two-bladed rotor heads, I've learned that about half of the normal control movement would be a good place to start. This means moving the balls on the servo control arms to the hole nearest the center. This reduced throw could also be accomplished by using the dual-rate feature of your radio, but I prefer to let the servo operate over its entire range and to reduce the length of the servo arm.

Having a direct control to the rotor blades also means a reduction in the collective-pitch servo throw, but this required a little experimentation, depending on which radio/servos you're using. Turn on the radio and set the collective stick to its mid-range position as if hovering. The collective servo should be in its approximate mid-range position. Note the servo position and turn the radio off. I'm assuming that the multi-blade system will hover at about the same pitch setting as our two-bladed system—about 4 degrees when using a pitch gauge. The Schluter pitch gauge (part No. 1366) has a range of 10 degrees positive and negative, has scales for both clockwise and counterclockwise rotating blades, produces consistent results, and has large, easy-to-read scales. Therefore, adjust the control-rod length from the swashplate to the head to give this 4 degrees to each blade with the collective servo in its hover position.

The total collective throw must be adjusted with the collective pitch set for hover. Again, I'm assuming that a pitch of -3 degrees will provide adequate descents (including autorotations) and that 8 degrees is a good maximum pitch for climb-outs (without overloading the engine) and 10+ degrees is good for autorotation touchdowns. The 4 degree hovering point is about midway in the desired pitch range, so it should be easy to adjust the servo-arm length (in or out, as necessary) to provide this range of pitch.

I'm very excited about flight-testing this multi-blade rotor system, and I'll report my results in a future issue of *MAN*, but right now I don't envisage any problems. However, because of the direct rotor-blade control, I still expect the Scout 60 to be more sensitive in comparison to the two-blade system, so the first few flights will be close to the ground to get the feel of everything. To those of you who are more familiar with multi-blade systems: How about sharing your experiences and opinions with me, so we can all learn more about this type of flying?

**Here is the address of the manufacturer mentioned in this article:*

Robbe Model Sport, Inc., 180 Township Line Rd., Belle Mead, NJ 08502.

Classified

WANTED: RTF U-Control planes from Cox, WenMac, Comet, Aurora, Testors, etc., complete or pieces, buy or trade. John Fietze, P.O. Box 593, Lynbrook, NY 11563.

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Send ad and payment to *Model Airplane News,* 251 Danbury Rd., Wilton, CT 06897. **Non-Commercial classified ads** (commercial ads of any kind not accepted at this special rate). Rate: 15 words or less, $4.50 payable in advance. No charge for name and address. Additional words, 25¢ each. **Commercial classified ads** (rate applies to anyone selling on a commercial basis—retailers, manufacturers, etc.) Rate: 50¢ per word, payable in advance. Count all initials, numbers, name, address, city and state, zip and phone number. **Closing Date** for either type of ad is the 20th of the third preceding month (for example, January 20th for the April issue). We do not furnish box numbers. If you would like your ad to run in more than one issue, multiply amount of payment by number of months that ad is to run. It is not our policy to send sample copies of tear sheets.

SPACECASE UPDATE

by PAUL TRADELIUS

IN THE JANUARY issue of *MAN*, I reviewed SpaceCase's* Modular Transmitter Case Kit, and since then I've learned more about this company, which is dedicated to building protective cases and accessories to meet our hobby needs.

SpaceCase has recently updated the latches on its transmitter kit to provide more positive locking, and the latches may now be secured with a small lock. Although I haven't had any problems with the original latch, I think the new one is an improvement, because the case can now be locked, and this is especially handy for traveling.

I've also recently finished assembling SpaceCase's Field Case Kit, which is another high-quality and easy-to-assemble kit. Designed as a case to support almost any type of modeling, it has the same modular construction as the transmitter case, but now there's more of it. Construction is also similar to that of the transmitter case, as everything is made of almost unbreakable plastic that's strongly glued together in seconds to form a bond of tremendous strength. However, some caution is necessary while gluing: Although a large bottle of cement is provided with the kit, use it sparingly, because a little goes a long way, and any excess could result in unwanted drip marks. I'm not sure what type of glue this is, but it actually melts the pieces of plastic to be joined, so when they dry, they virtually form one piece. I've been using my Field Case for several weeks, and not one joint has shown the slightest sign of weakening.

Using this fast-drying glue, a basic box with special sides and top is quickly constructed. A power panel fits in either side extension, and these also act as handles for easy lifting. The top is also molded to accept a carrying handle, as well as the foam supports that you cut to fit your model.

Some special features of the Field Case are that it's completely fuelproof, it doesn't need finishing, all assembly materials and glue are provided, and the finished case is extremely strong and light. I also like the large swing-down door, with supports that make it easy to reach anything inside. And inside, there's plenty of room for battery, fuel, electric starter, pump, two pull-out trays and more.

You can set up the inside compartments as shown in the instructions, or custom-fit them to your equipment with the extra material provided. Legs that fold easily and snugly underneath enable you to stand it upright at the field and then fold it to fit into your car. *Very* convenient! And although I haven't yet seen them, the newest Field Cases have an improved folding-leg system.

The Helicopter Case is another SpaceCase product that will interest helicopter drivers. Available in either a pod-

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SPACECASE

(Continued from page 126)

and-boom or a Bell 222/Airwolf version, this isn't really a kit, because it comes almost completely assembled. However, the interior can be arranged to suit your own model, so providing maximum protection during transportation. If you plan to attend a distant contest or flying event, SpaceCase products will protect your equipment en route and also provide plenty of ground support for all your accessories.

**For more information on these, and other Matrix Enterprises SpaceCase products, see your local dealer, or write directly to:*

Matrix Enterprises Inc., 7015 Carroll Rd., San Diego, CA 92121.

A GLOSSARY OF HELICOPTER TERMS

ATS

Automatic Tail-Rotor System. This electronic mixer on a helicopter radio transmitter automatically varies the tail-rotor pitch to counteract the engine torque at different power settings.

AUTOROTATION

Equivalent to a dead-stick landing for an airplane.

BELL-HILLER

A combination of Bell and Hiller rotor control systems. *(Continued on page 133)*

NAME THE PLANE CONTEST

Can you identify this aircraft?

If so, send your answer to Model Airplane News, Name the Plane Contest (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897.

Congratulations to Isaac Zelazny of Topsfield, MA, for correctly identifying the British Miles M.100 Student. Isaac's name was chosen from the ten correct answers received. Interestingly, two entrants identified our mystery airplane as the Fairchild Republic F46 trainer, which was cancelled last year.

The Student was a private venture, two-place trainer powered by a single Turbomeca Marbore IIA engine located in the upper fuselage. It first flew 21 years ago on May 14 and claimed a 289mph maximum speed.

The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S. Mail and will receive a free one-year subscription to Model Airplane News. If already a subscriber, the winner will receive a free one-year extension of his subscription.

Club of the Month

North Dallas R/C Club

The North Dallas R/C Club is *Model Airplane News'* "Club of the Month" for August, 1988.

This competitive group of fliers has just emerged victorious from its Challenge Cup competition against the Richardson R/C Club. The NDRC edged out the Richardson club by a 202-point margin. We don't know what criteria were used for scoring, but the newsletter indicated that points were given for wearing your club's shirt/patch and for your plane. (We don't know if points were awarded for the plane's appearance, or just for *bringing* one!) Being able to fly and perform loops netted a few points, and points were also given for crashing! Is their points system logical? *You* decide! For wearing the shirt/patch: five points; five points for your plane; ten points for flying; and for crashing, you get *50 points!* If the competition from Richardson had crashed four planes and sewn on another patch, they could have come home with the gold!

All kidding aside, "High Fliers," the club's newsletter, contains valuable information, including building tips, advice on the purchase of airplane kits, and, of course, a list of upcoming events. One event on the agenda caught our eye: Kid's Day. The members of the NDRC put on a show for the children of the Dallas Baptist Home for Children. Each member shows one of the children the fascinating world of model airplane building and flying. Good work!

With great pleasure, the staff of *MAN* has chosen to award the North Dallas R/C Club—a group with humor and compassion—two, free, one-year subscriptions. The subscriptions may be given to a couple of the club's outstanding members, or perhaps to one of the future modelers at Kid's Day.

Each month **Model Airplane News** will select the club newsletter that best shows the club's activities and energies directed toward the furtherance of the hobby. The award is not based on size or quality of the newsletter, and can be about any aspect of the hobby (F/F, C/L, R/C, boating, cars, etc.). **Model Airplane News** will award two free one-year subscriptions to be given by the club to outstanding junior members. So send your newsletter to **Model Airplane News,** Club of the Month Contest, 251 Danbury Rd., Wilton, CT 06897.

HELICOPTER TERMS

MIXING
In this system, the main rotor blade pitch is controlled both directly by the servo and indirectly through the flybar.

BLADE TRACKING
A procedure used to determine whether both rotor blades are producing the same amount lift.

COLLECTIVE PITCH
Refers to a rotor head, which can vary the pitch of the main rotor blades, making vertical thrust dependent on rotor speed and pitch.

FIXED PITCH
Refers to fixed main rotor-blade incidence, making vertical thrust solely dependent on rotor speed.

FLYBAR or STABILIZER BAR
A part of the rotor head that stabilizes the rotor blades. It also serves as a directional control mechanism, transmitting control inputs to the rotor blades.

GROUND EFFECT
The effect of the ground on the column of air lifting the helicopter, within about one rotor diameter above the ground.

GYROSCOPE
A mechanical and electronic device mounted in the helicopter. It senses movement around the yaw axis and automatically applies tail-rotor input to counteract this unwanted movement.

HELICOPTER RADIO
A radio control with specialized mixing functions for helicopter use; usually ATS, adjustable pitch curve, high idle and throttle hold.

HIGH IDLE
A selector throttle low end-point adjustment. Usually set so that flying rotor speed is maintained when rotor pitch is all the way down. This function is useful in rolls and loops.

HILLER MIXING
A rotor-blade control system providing direct control to the flybar that drives the main-blade pitch control.

PITCH CURVE
The relationship of the engine power to the main-rotor pitch.

ROTOR DISK
The area swept out by the main rotor blades in one revolution.

SWASHPLATE
A device consisting of two rings connected with a ball-bearing race suspended on a ball. This device allows transmission of control inputs from the stationary fuselage to the moving rotor head.

THROTTLE HOLD
A selector switch that uncouples the throttle channel from the left stick and holds it at a predetermined setting, so allowing the collective pitch to be controlled independently of the throttle; usually for autorotations.

TRAINING GEAR
A flight-training device, usually consisting of two long dowels with plastic balls on the ends, crisscrossed and rubber-banded to the helicopter landing skids. This enlarges the machine's "footprint," so preventing tip-overs and damage.

TRAINING STAND
A flight-training device that tethers the helicopter to the ground and allows only limited movement of the machine on all flight axes, so preventing the possibility of damage.

MODEL AIRPLANE NEWS

HOBBY SHOP DIRECTORY

Retailers: Make your business grow with new traffic! Now you can advertise your hobby shop in the **Model Airplane News Hobby Shop Directory.** The listing will be published monthly and will be listed according to city and state. You will have 3 to 4 lines, approximately 20 words, in which to deliver your sales message, plus space for your store's name, address, and telephone number.

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